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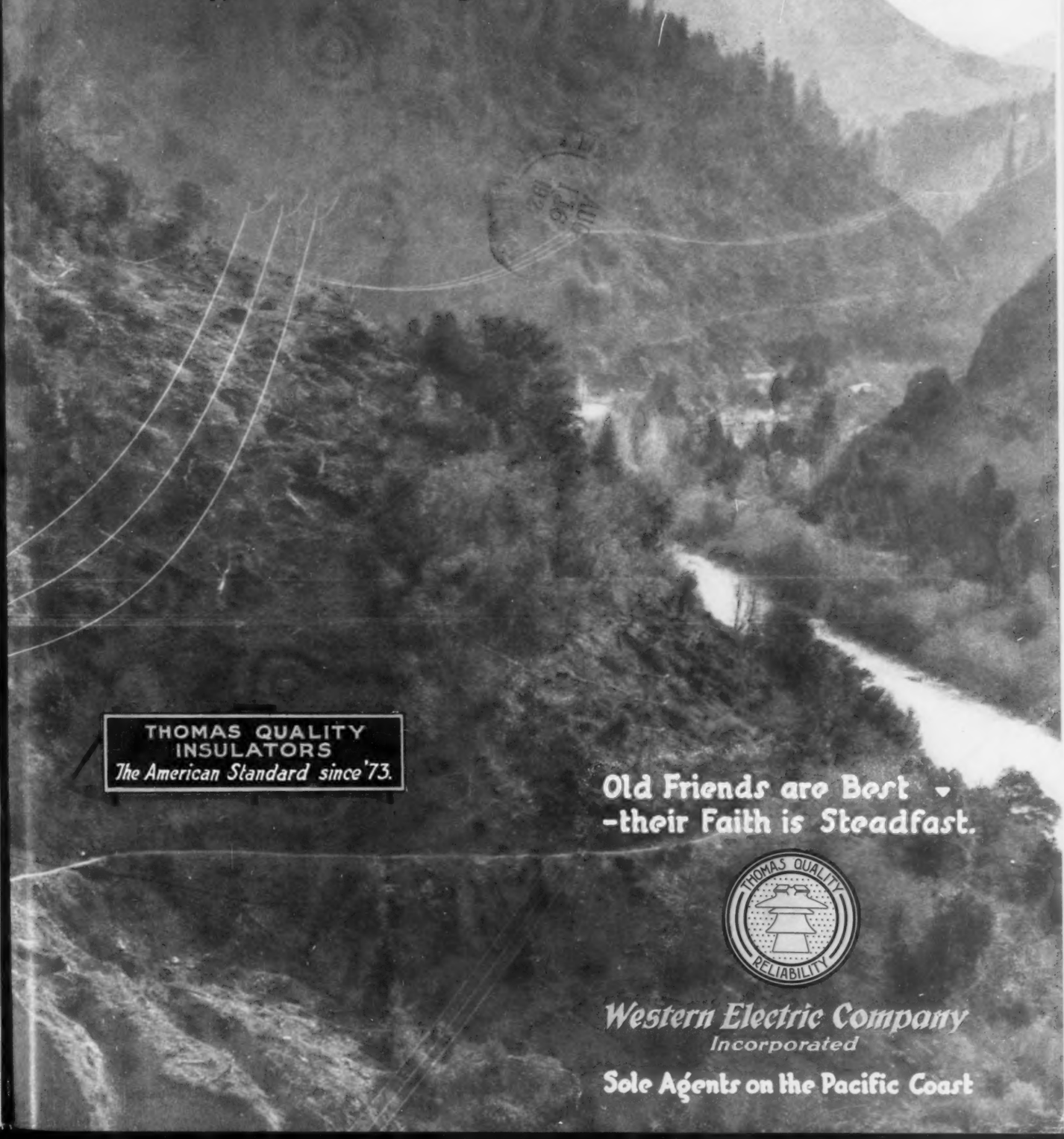

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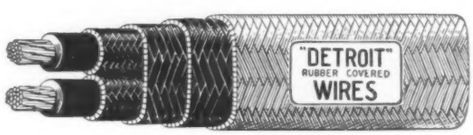

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Journal of Electricity and Western Industry

A semi-monthly chronicle of western events, advocating the economy, efficiency and convenience of electric power for all industries of the West—manufacturing, agricultural, mining, merchandising, home building and home making. Interpreting the value of electrical development to the business and financial man, the industrial man, the power man, wholesaler and retailer, contractor and constructor, engineer and home owner.

Because of the abundance of water power in the West susceptible of economical development, a dependable, uninterrupted supply of cheaper electric power is assured for these industries. The basic industry of the West—hydroelectric power generation—for which Journal of Electricity and Western Industry is the spokesman, is therefore logically and inseparably linked to the growth and prosperity of all phases of our daily life and business.

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THE WEST'S NEWEST HYDROELECTRIC PLANT

WITH the starting up of the new Caribou plant of the Great Western Power Company on Feather River, two 30,000 hp. units were put into service to furnish more power for the growing industrial needs of the central California district. The new installations are the largest capacity impulse type turbines in the world, and operate under a 1008-ft. head. The 165,000-volt transmission line carrying the power some 187 miles to the coast, makes the famous crossing at Carquinez straits in a single span of 4753 feet, the third longest in the world. The picture shows the water shot from the power house just before the giant turbines went into action.

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Journal of Electricity and Western Industry

A publication devoted to the upbuilding of the great industrial West and the countries bordering on the Pacific

A McGraw-Hill Publication

Interpreting Western progress through the application of electric power, light, and heat in industry and in the home

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Vol. 47, No. 3 SAN FRANCISCO, AUGUST 1, 1921 Per Copy, 25 Cents

DIP THE LIGHTS

A great idea has been suggested in recent weeks, namely, that of dipping the lights throughout the nation at exactly 8 p.m. each evening, thereby enabling every householder to get accurate time in his home. Here is a splendid way whereby the accuracy of time pieces may be improved, and at the same time an impression made on the public mind as to the indispensability of electricity in every home throughout the nation. The New York Times has recently carried three columns devoted to this subject, and much discussion is current in eastern centers. In the West the problem is considerably simplified due to the interconnected systems traversing entire districts equal to combined areas of several eastern states with individual lines, and often running for hundreds of miles under the control of one dispatcher. The idea seems to have unusual merit attached to it, and the good will awakened in the public mind by such a move should not be overlooked.

Unless power users, particularly those operating motors equipped with low voltage cutouts where a drop in voltage would stop the motors, can be protected during the proposed flicker signal, the idea cannot be considered. But the good to be attained by such a move is worth the most serious consideration.

Private Ownership Lives Up to a Responsibility

THE cost of electricity to the average westerner today is about fifty per cent of what it was in 1902—and this despite war increases and the price of oil. This reduction is but the outward mark of an advance in every department of the electrical industry—an advance which may be credited to the enterprise and to the sense of their responsibility to serve displayed by the privately owned public service companies of this region. This has not been wholly a matter of money making. Regulation has forbidden public utilities the right to make exorbitant profits by any means—and reduction in costs means at once reduction in rates. On the other hand, the public service industry is to some extent protected in its return, so that it might have been expected to rest content with somewhat lesser achievements, safe at least from immediate competition.

This has not been the case. 40,000-volt transmission has given way to 60,000, to 110,000 and now to 220,000-volt transmission. Larger and more efficient types of generators, transformers, insulators, pole tops and switches, longer spans and greater transmission distances have been worked out and employed because they mean greater economy of operation, and, in the end, lower rates to the consumer. The employment of this new equipment has often meant the abandonment of less advanced types still capable of many years' use—a loss for which the companies in the past have not always been allowed recompense, so that the company in many cases has actually stood to lose a considerable income. In every case, however, the forward step has been taken—and the rates reduced.

The subject of long spans and submarine cables which is featured on another page of this issue is but one phase of the quiet and yet daring work which is being continuously carried on by the engineering departments of these companies in the interest of better service at less cost. Some of the engineering accomplishments which have been called forth in this service are recognized as world achievements. That this spirit has been fostered and that these achievements have been made is the greatest possible tribute to the healthy sense of its public responsibility which private ownership in this great industry has developed.

The Importance of the Electric Pump to Agricultural Development

THERE were 88,496 more farms in the United States in 1920 than there were in 1910; there were 105,466 more farms in the Pacific and Mountain states at the end of the same period. In other words, the number of farms in the eastern portion of the United States actually decreased during the past decade, while the West largely extended its acreage, so that the entire increase for the United States may be credited to the country this side of the Rockies. Combine this fact with the striking figures on agricultural growth which are available for one Western state, and it is clear what a master role the electric pump has played in rural development.

Of the one million four hundred thousand acres which were brought under irrigation in California during the ten years from 1910 to 1920, over one million one hundred thousand of them were above the level of gravity irrigation and had to be irrigated by pumping. This represents a little more than one third the entire increase in farms of the entire United States. Utah, Nevada and all the Southwest country, as well as much of Montana and districts of Idaho, Washington and Oregon are dependent upon irrigation for their agricultural development. To the electric pump, in short, is due the greater part of the agricultural development work going on in the country today—and to its services we must look for the growth of the future.

Plans for a Bridge Across San Francisco Bay

THERE has been much discussion throughout the San Francisco Bay region relative to the bridging of San Francisco Bay. All well-wishers of the West see in this activity one of the most important pieces of work that can be accomplished for the upbuilding of the West. San Francisco, a city of over half a million people, is so isolated from the rest of the world that it has but one outlet to the country and for five hours of the twenty-four-hour period it is cut off from ferry service with the mainland. Needless to say, this situation cannot go on indefinitely, and cities generally throughout the San Francisco Bay region have come to this same conclusion. It would seem that the plans submitted by Messrs. Davies and Modjeski do not entirely meet the situation. Their plans would very effectively solve the automobile situation, but would have practically no effect in improving the commuter situation in cities other than Alameda and Oakland, which after all is a big part of the problem—namely, to make the time from office to home a minimum. Let us hope that the matter will not be dropped here, however, but that earnest consideration will bring forward a solution upon which all can agree.

The West Awaits Intelligent Tariff Legislation

WESTERN farmers have always stood for a reasonable protective tariff, in so far as it is designed to protect legitimate home industries. And their position is a logical one. We are prompt to take measures against child labor and sweat-shop methods in our own country. In effect, the protective tariff is a form of similar legislation, designed to protect the higher standards of living of our own workmen against lower living conditions elsewhere. Italian farm hands get next to nothing for their services and live under conditions which we would not be willing to permit among our working classes; Japanese and Chinese laborers receive the equivalent of a few cents a day and live intolerable lives from a western standpoint. What we are doing in the protective tariff is protesting against these lower standards and raising a dam, as it were, to maintain our own higher level of life.

There is less excuse for the protection of industries which are not a natural growth of this country. Under present still unstable international conditions, there may be some excuse for deliberately fostering an industry which would be essential to national independence in the case of war—but further than that, the interests of the world demand that advantage be taken of varying climates and soils, and of divergent national traits. If the Japanese are expert in the manufacture of Satsuma ware, there seems to be no reason why we should establish a factory here and maintain it at enormous expense by a protective tariff, and if a German genius for toy manufacture produces the best toys, it certainly would be false economy for us to bar them from the country.

There is also another side to the tariff question. Western canned fruits, western wool, western timber and western manufactures, as well as products of eastern mills and factories, demand a foreign market. The effect of confining distribution to home fields is seen in the number of failures which the last year has recorded among the canneries of the West. If there is anything which the post war period has taught, it is that foreign trade is only possible upon the basis of an exchange of products. A creditor nation cannot afford to build up a wall of high tariffs. No foreign country can absorb our goods if it is not allowed to send us others in exchange.

What the West needs is a sane handling of the tariff problem. It is not a question of special interests, western or otherwise,—it is a problem to be handled from the national aspect. And upon an intelligent recognition by Congress of what constitutes national welfare in this respect depends in great part the immediate prosperity of western industry.

Summer Sessions of Electric Clubs

THE development of the electric club throughout the West has been one of the outstanding features of the current year. The Los Angeles Electric Club, which has recently come into existence, now has a membership of about 700. This club recently adjourned for a two months' vacation. The San Francisco Electrical Development League, comprising something like 700 members and now recognized as one of the most powerful bodies for civic betterment in San Francisco, recently put to the vote the question as to whether the League would close its sessions for the summer months. The editor of this journal urged that there be a cessation of activities for the two summer months, following the custom of former years; but the response came back, vigorous and unanimous, calling for a continuation of the sessions, and all statements publicly made were at once retracted. It is with sincere congratulations that the Journal of Electricity and Western Industry commends the League for the evident spirit of enthusiasm that pervades its meetings at the present time. With this enthusiasm maintained, there will be no lull in the fall sessions due to the continued activity during the summer. Indeed, during the summer months many eastern visitors of the

electrical industry appear in San Francisco, and contact with the trade may be greatly forwarded by having these League meetings continued each month during the vacation period. Many trying situations, also, now facing industry as a whole, can be watched more closely during the summer months, with the League meetings in full session.

Sale of Electrical Securities Indicates Mutual Respect

THE unique campaign instituted by men of the electrical industry in the West to forward the sale of electrical securities among members of the electrical industry has proven of great helpfulness. This is true, not because of the volume of sales but rather because of the moral support to the public service industry that such a movement carries with it.

Some time back there was recorded in these columns the gratifying results that were accomplished in San Francisco in sales of this nature. Now comes the news from Los Angeles that the Electric Club of that city has increased the number of men holding electrical securities by over eleven hundred, divided among jobbers, manufacturers and contractor-dealers, representing an investment of nearly two hundred thousand dollars. The Electrical Development Army of Los Angeles which has charge of the drive, is to be congratulated upon this excellent work, and once again is to be recorded in the electrical industry what true cooperation among all branches of that industry can accomplish.

Fitting the Sales Argument to Business Conditions

THE recent convention of the Pacific Coast electrical supply jobbers at Del Monte emphasized in all its aspects the sale of labor saving devices, and it is apparent that plans for the coming year include a special featuring of these lines of equipment. Even in a period of business depression along some lines, they look forward to increased sales of washing machines and vacuum cleaners and similar conveniences of the home.

The psychological reasoning is good—and the electrical appliance is one of the few types of material which should be able to look forward with confidence, irrespective of general financial conditions. The reason for this advantage lies in the peculiar function of this equipment. It is not exactly a necessity—but on the other hand, it is not a luxury. Its peculiar appeal lies in its function of saving—the saving of labor and the saving of money. The housewife who has her washing done by a Scandinavian girl or a Japanese does not buy a washing machine for its beauty, nor even for its convenience, so much as because it is actually cheaper for her to do her own washing in this way or because her wash woman can do so much more in the same time. On the other hand, there are many households which are getting along without servants at all for the first time due to the hard times, as well as others who have given up one or another form of outside service, such as laundry. It is for such people that the labor-saving argument has its especial appeal.

The Growing Influence of the Realtor

IN forwarding the present movement that is leading men of the industry to organize and cooperate one with the other in the upbuilding of the West, we must not overlook the fact that one of the strongest and most helpful groups of men is to be found among the realtors of the West. Some years ago it not infrequently happened that men engaged in this work were brought into much disfavor on account of unethical real estate deals put across upon the public. But today it is questionable whether there exists a more progressive and ethical group of men than the organized realtors of the West. Take the California Real Estate Association as an example. Here is an association representing approximately 30,000 realtors in the state of California. No one can attend its meetings without being much impressed with the possibilities that lie within the scope of this association. The realtor generally is a wide-awake man of considerable vision, and he is a great factor in state and interstate development. His livelihood depends upon the very development work in which he is engaged. It is no wonder, then, that 30,000 active men, trained talkers and analyzers, are as an organization in a unique position to forward the upbuilding of the West. Something should be done to make a closer tie-in between industry and this powerful body of men, in order to foster a closer cooperative effort between the two groups.

If the Self Interest Story is Good, Tell It to the Wife

ONE of the most successful meetings of the year was recently held by a western electrical organization which carried out a "Tell-it-to-the-Wife" day. The members invited their wives and other prominent women of the community to luncheon, and there told them the story of the convenient convenience outlet, and of the basic role of the power company in western growth. It is safe to say that this was the first time some of the women present had heard either story.

The woman has as much to say as her husband in the forming of public opinion—perhaps more. With few exceptions, such as collars and tobacco (such distinctions are fast disappearing), she is the largest ultimate consumer of manufactured products, and the person most concerned with the industrial growth which will provide them for her. Certainly she is the interested party in all questions which concern the convenience of the home. It might perhaps be too much to suppose that the wives of all electrical men were interested in the welfare of the electrical industry because their husbands were thus employed—but every woman of them is interested from her own "self-interest" angle. Tell the story to the wife. From the hen up, the feminine gender is famous for its advertising powers.

Western Comment on Current Events

Editorial Notes and Readers' Views on the Outstanding Aspects of Financing, Trade Promotion, Legislative and Associated Topics that have a Special Bearing on Western Business

Los Angeles Power Plans Criticized by Interior Cities

Intercounties Committee Protests Diversion of Power from Other Sections of the State For Los Angeles Use

The recent decision of the United States District Court which grants the City of Los Angeles the right to condemn the Owens River Gorge property of the Southern Sierras Power Company, fixing the price at $525,000, has been appealed and is now before the higher court for reconsideration. The contention of the power company is that the water rights in question are necessary to its further development to serve the needs of Riverside, Redlands, San Bernardino and Imperial Valley towns. The combined interests of these communities have now entered the discussion and it is reported that Riverside is to intervene in the suit. Much publicity has been given to a protest made by the chairman of the so-called Intercounties Committee of California in which he alleges that Los Angeles is endeavoring to dominate the industries of the central and southern valleys of the state through control of the power sources which must serve their needs.

It would seem that there is something in the allegation, although perhaps the published accounts savor a little too much of newspaper sensationalism. Certain it is that a few months ago Los Angeles was filing on all the available power sites in the National Parks as far north as Yosemite Valley. When that plan was frustrated through a burst of popular indignation, the result was merely to change the filings to certain other power sites a little less in the public eye. The former question involved was whether the public could afford to allow the control of power needed for state development to pass into the hands of any one city. Apparently that point is still involved. There is no question of the right, although there may be some of the advisability, of a city developing power for its own use. But it is a grave question whether the rights of other communities to their own independent power service, whether through their own development or through service from a private company, is not equally established. And when it comes to the generation of power by a municipality beyond the needs of the individual city for the purpose of selling that power to other communities and agricultural districts, a very grave danger is apparent. The entire West is interested in the principles involved in the Los Angeles suit. If Los Angeles is going into the commercial power business, much as it might open a hotel or a grocery store in some other community, for the profit involved, concerted action should be taken against such a step. If it does not contemplate such action, in the interests of its good name, it should explain its intentions.

What Makes Western Utilities a Good Investment

Wall Street Journal Names Securities of Two Western Utilities Among the Five Leaders with Attractive Market Possibilities

In commenting upon the public utility situation, William J. Keary in the Wall Street Journal brings out the fact that no type of enterprise suffered more severely as the result of the economic disturbances of the war than the public utility; while industrial corporations could increase prices with the increase in the cost of production, public utility rates have been controlled by regulatory bodies that acted more with an eye to politics than from the standpoint of elementary justice.

"Undoubtedly the public had an opportunity during the war to learn as never before how vitally necessary to industry and to the convenience and comfort of man is the service rendered by the public utility. Slowly it came to realize that if a business is to render the most efficient service it must have a chance to exist and have a square deal."

"Public utility securities have already begun to discount the increasingly favorable outlook, but most of them are yet obtainable at bargain levels."

Five of the most prominent companies are discussed in detail and the first two to be considered are the Pacific Gas & Electric Company and the Montana Power Company. Of the first he says:

"Pacific Gas & Electric is one of the largest public utility properties in the United States. It is among the few strongest, if not actually the strongest, public utility corporations viewed from the standpoint of the character of its business, the excellence of the territory it serves, its record during the trying period of the war and its financial position. * * * If bought at present prices, the common stock offers a nice return and seems to have good long pull possibilities. The regulatory authorities are fair minded in their treatment of the utilities and allow rates that will give a return of 8% on the investment. California is a growing state with a diversification of industries that will make increasing demands for power. With business enhancing, costs decreasing, and public good will in its favor, all signs point to greater earning power for the Pacific Gas & Electric."

In referring to the Montana Power Company, which he characterizes as a tower of strength among the utilities, he says:

"It has taken advantage of the water power resources of its territory, and accordingly has little to worry about in

rising prices for coal and oil. Despite the depression existing in the mining districts in Montana, which are served by the company * * * the gross earnings for 1920 were the highest in the company's history. * * * Fortunately for the company, its activities embrace the principal agricultural and timber sections as well as most of the large towns and, therefore, it does not feel acutely the unfavorable situation in the mining industry. Then the company has a 99-year contract with the St. Paul Railroad to furnish the power necessary for its electrified track, which adds to the stability of its earning power. * * * At its present price of 53, the stock gives a yield of 5.6%. Obviously it is selling in anticipation of an increase in the dividend rate, as a yield of 6% cannot be considered highly satisfactory for a stock of this class."

The article goes into more detail regarding these two Western properties, and is evidently written after a careful analysis of the public utility situation throughout the country.

San Francisco Building Strike Nears Favorable End

American Plan Probable Outcome of Building Deadlock in San Francisco and Vicinity

Latest reports would indicate that a 7½ per cent wage reduction and the American plan will be the basis for the final settlement of the San Francisco building strike. Alameda county unions have already accepted these terms and in San Francisco there are 4,000 men at work and 1200 building jobs under way. An industrial association has been formed which has pledged $1,300,000 to place the present movement toward the American plan on a permanent basis. This organization states that its aim is not the destruction of the union, but that agreements will be made only with individual employes, there shall be no restriction of output and the eight-hour day shall be observed as the basis for wages.

Reclamation Projects to Stimulate Utah Growth

Former Governor Predicts Prompt Action by Congress on Bills Providing Quarter Billion for Western Development

The possibility of further government support for western reclamation projects is one of the major elements determining the growth of this region along all lines of industrial as well as agricultural development. That Congress was prepared to take prompt action which would insure the expenditure of large sums of money for this purpose in the near future is the prediction of former Governor William Spry of Utah, now commissioner of the general land office at Washington, D. C. The statement was made during a recent visit to Salt Lake City for a series of conferences on matters related to the administration of the vast public domain over which he is now presiding.

Commissioner Spry said:

"With the determination by the present special session of Congress of the pressing problems of the tariff and of taxation the way will be cleared for action on irrigation and reclamation measures of vast importance to the West, and the probabilities are that the Smith-McNary bill, calling for the appropriation of $250,000,000 for such vital undertakings will be approved."

Commissioner Spry emphasized the importance of taking up reclamation enterprises in the West by saying:

"We must devote our energies to the upbuilding of the country, to the development of the interior, and through public works to that end we can provide employment, add vastly to the wealth producing possibilities of the country, and better the general economic conditions in a most wholesome way.

"It is probable that both committees in the house and senate will favorably report the Smith-McNary bill to provide funds for essential reclamation work, and if so Utah, Idaho and other western states will of course receive ample proportions of the money which would be provided.

"No good purpose can be gained by failing to face frankly the fact that business is poor in almost all parts of the country, though Utah is in a much better position than many other states. And it is probably only fair to say that perhaps the bottom has not yet been reached. But as soon as congress fixes the tariff and determines both the amount and the nature of the taxes to be levied, progress is certain.

"We can confidently look forward to an order bringing into use of vast reaches of now unproductive lands through the medium of government irrigation and reclamation undertakings."

State Extravagance Hampers Industrial Enterprise

Leader of Industry in the West Protests Against High Tax Rates Due to Unwarranted State Expenditure

Wigginton E. Creed, president of the Pacific Gas & Electric Company and of the Columbia Steel Company, as well as a director and owner of many of the industrial activities of the West, in an interview with a representative of the Journal of Electricity and Western Industry, has forcibly backed up his statement made at the recent Pacific Coast Industrial Conference held under the auspices of the Pacific Coast Section, N. E. L. A. at Del Monte. Mr. Creed is profoundly impressed with the extravagance of our present state government, and in part said as follows:

"One thing the investor is interested in and that is the attitude of government toward industry. This is a national issue as well as a state issue. The national government is proceeding intelligently, but I want to say here just as I said in Sacramento, that the greatest economic crime any state government can commit is to indulge in the kind of economic thinking our state government has been following. The total state appropriations for California for the next two years which have been checked by the Comptroller to date,—they are not all in—amount to $91,120,000. Two years ago the state budget was forty-seven million, the appropriations five million, a total tax bill of $52,000,000. Our state government in times like these, when the very economic heavens cry out not to do it, has sanctioned total appropriations of more than ninety-one million dollars for the next two years. The estimated revenue available for the same period is eighty-three million dollars plus an accumulated surplus of six million dollars, so that there is a constructive deficit of a little over two million dollars today. This thing has been done, at a time when economy is being practiced by every sound, sane thinking man in the state of California. I make no apology for criticizing. I am not in politics and no company I am connected with ever will be in politics, but I will continue to assert and exercise my right to say what I think of that sort of public policy and to tell the people of this state the economic crime committed against them by that sort of governmental action."

The transmission lines that connect the great water power sources of the West with the industrial and agricultural centers, have involved many notable engineering feats, on account of both the great distances to be traversed and the varied difficulties presented by mountains, desert and waterways.

Handling the Long Spans on Western Transmission Lines

Special Problems of Line Construction and Engineering Method Required by Western Conditions in Bringing Hydroelectric Power from Mountain Sources for the Service of Industry

Those whose school days came in the string-telephone era, before the development of amateur wireless sets, are probably fully acquainted with the difficulties of running wires from one window to another,—across a vacant lot, a grove of trees and the gables of a couple of houses. Anyone who has climbed up a rain pipe with a string tied to his ankle, or hung head downwards from a window to catch a line thrown up from below, will look with wholesome respect at the great spans of the western hydroelectric transmission lines, strung across wide rivers, snow-covered mountains, and deep, precipitous canyons. We are accustomed to take these engineering feats very much for granted—except on one or two occasions when we hear that a world's record has been broken—and only the initiated few realize fully the difficulties and dangers involved in constructing some parts of a transmission line.

The normal spacing between the towers on a transmission line ranges from about 500 to 800 feet, but sometimes it is necessary to swing the line across a canyon in a single span of over 2,000 feet from tower to tower. The canyon may be a thousand feet deep, with rocky precipices for walls, and a roaring mountain stream at the bottom. To cross from one side to the other it may be necessary to fell trees and cut a path through tangled brush—in fact, the clearing of the right-of-way for a transmission line in the West often has all the local color of pioneering in the wilderness.

A steel conductor some three-quarters of an inch thick cannot be shot across a canyon on the end of an arrow, or fastened around the waist of a human fly and dragged up a cliff. It is necessary to run a hemp or light steel line over the tower to which the heavy wire is to be attached, sometimes using an intermediate line slightly heavier, and then pull up the wire to its proper tension.

In crossing a canyon floor, the reel on which the wire is wound is usually mounted on skids for hauling over the rough ground, the Great Western Power Company of California having developed a special machine for this purpose. The light line is carried up to the high point on the canyon wall where the tower is located, and hauled usually by horses until the main wire is raised up to the desired position. In isolated spots it is not practicable to employ electric power for hoisting, and if the pull is excessive for the number of horses available, blocks are used to increase the pulling capacity.

Record Spans at Carquinez Straits

The present western records for aerial spans are held by the two great crossings at Carquinez Straits, California, that of the Pacific Gas & Electric Company, constructed in 1901, 4427 feet long, and that of the Great Western Power Company, completed in 1920, 4753 feet. The first carries current at 60,000 volts, the second at 165,000 volts. There are special difficulties involved in the construction of such spans as these, not only on account of the tremendous weight of cable, but on account of the location, with all its complications of tide and traffic. The waters of the San Joaquin and Sacramento riv-

ers flow through this comparatively narrow channel, and, combined with the ocean tides, make a heavy and dangerous current. The resultant conditions render a submarine crossing at this point impracticable for a high tension line, owing to the excessive wear and tear involved in the combination of strong currents and rocky bottom.

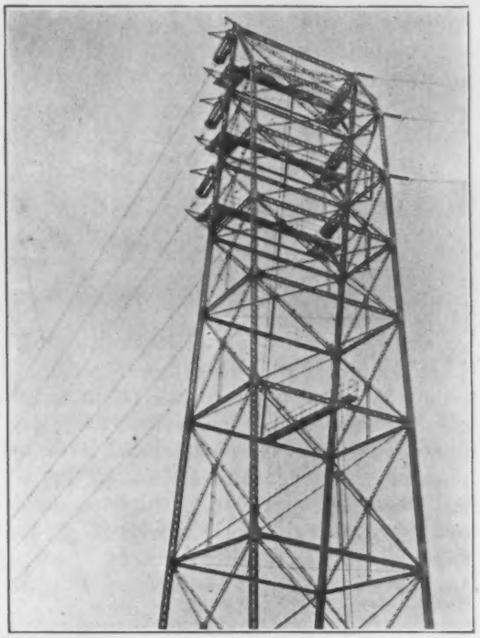
Difficulties of Tide and Traffic

Even the aerial cable, however, is laid through the water at first, and on this account the work has to be done exactly at "slack water," in the brief period at low tide or high tide when the current is negligible. One end of the cable is made fast to its permanent anchorage on the tower, and the remainder, still wound on the reel—and weighing some 12,000 pounds—is loaded on to a barge. Exactly at slack water the barge is towed across the strait and the cable paid out. Wooden brakes used on the reel to control its revolutions, frequently set up such tremendous friction as to make fire imminent, and necessitate a supply of water conveniently at hand.

The slack water period lasts less than half an hour, with the result that this part of the work must be started exactly at the proper moment and carried through with the utmost dispatch. Any hitch will mean a delay of from six to twelve hours, until the next low or high tide.

Besides the tide there is traffic to be reckoned with. There is more or less constant navigation through the Carquinez straits, and the company stringing its transmission cables has no right to obstruct the passage even temporarily. When the line has been dropped across the channel, and the surplus coiled in a figure-eight on an improvised wharf, the process of drawing it taut cannot always be started immediately. The deepest water in the straits is about 120 feet, and in order that traffic may pass, the cable must be a certain distance either above or below the water surface at the navigable part of the channel. Lookouts must be posted, and every stage of the work carefully timed. The final clearance required is 206 feet above the high tide water surface. The stringing of any one of these cables involves three or four days' work, and as there are six on each of the two lines that make this crossing, the task is an extensive one.

In anchoring the cable to the second tower, a light line is used as in the case of the canyon spans, but the pulling is done by a hoisting engine. When the cables are drawn up to their proper position, the pull on each is over 20,000 lbs. Thus not only is a special type of tower construction required for these great spans, but also a special insulator arrangement with sufficient mechanical strength to withstand the excessive strain.

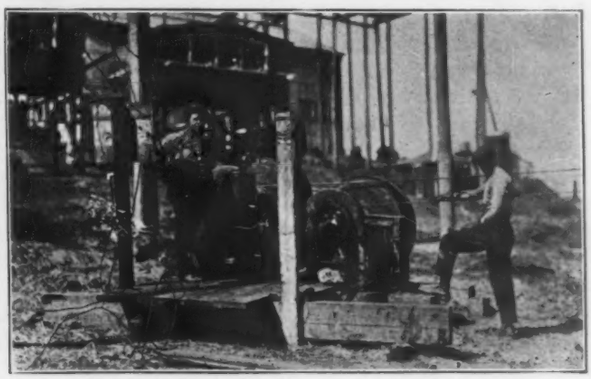


A western record in aerial spans. Upper section of one of the towers at the Carquinez crossing of the Great Western Power Company of California.

World Records

The other famous spans in the United States—the only ones in the world which surpass the Carquinez crossings—are those of the Shawinigan Water & Power Company and the Knoxville Power Company. The first crosses the St. Lawrence River in a single sweep of 4801 feet; the other, a world's record, stretches across the Little Tennessee River Gorge, 5010 feet from tower to tower, operating at 150,000 volts.

Special machine developed by the Great Western Power Company for unwinding conductors to be strung across a canyon.



Hoisting cable across the Carquinez Straits, Pacific Gas & Electric Company. Note the telephone receiver attached to one of the workers.

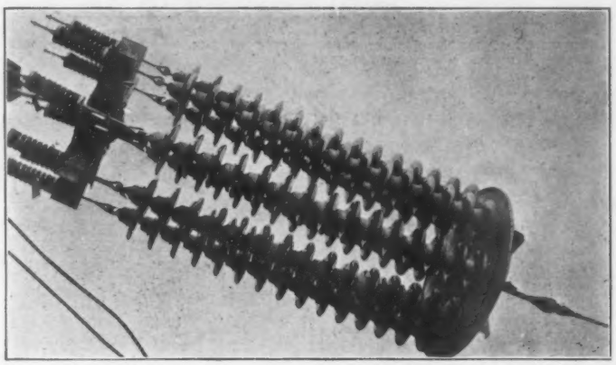
Spectacular engineering feats have necessarily played a notable part in western electrical development, both on account of the great distances to be covered in the transmission of hydroelectric power, and the many problems involved in water power development in rugged and mountainous country. The Carquinez spans rank, together with record dams, high voltage lines, and large-scale water storage, among the many achievements which the West owes to the courage and resourcefulness of its engineers.

GREAT WESTERN POWER COMPANY

BY JOHN A. KOONTZ
Electrical Engineer

When it was necessary for the Great Western Power Company to bring additional power from the Feather River into the bay district, it seemed advisable to come in from the north and cross the Carquinez Straits with a 165,000-volt line. This span crossing the Straits is 4753 ft. in length and is supported on double circuit steel towers. The towers are in duplicate, each being 195 ft. in height and carrying 6 wires, three on either side; the wire spacing being 20 ft. in the vertical and 35 ft. between circuits, each tower containing 153,300 lbs. of steel.

Because of the ease for testing and making replacements or renewals, the insulators were made up of modern 10-in. suspension units. The dead-end insulator is composed of 8 strings of 10-in. disc



Insulator arrangement on 4753-ft. Carquinez crossing of Great Western Power Company

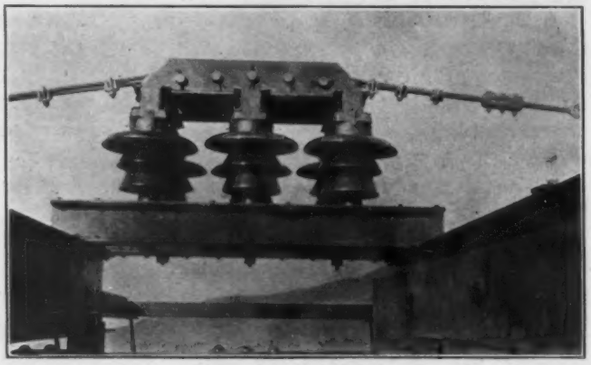
units, each string consisting of 15 elements. These 8 strings are attached at each end to a steel spider, which in turn is attached on the one end through eye bolts and cable to the conductor, and through eye bolts on the opposite end to the tower. On the tower end, the individual strings are fastened to an eye bolt, this eye bolt running through a coil spring which comes in compression against the steel spider on the tower end of the insulator. These eye bolts are threaded, and by proper adjustment of the attached collars, the spring tension can be so adjusted as to equalize the load on all 8 strings. The springs used in this work were all carefully tested, and only springs having the same length and compression characteristics were used on the same conductor, so that with careful measurement of the spring length, there is no difficulty in knowing that the various strings are carrying their proper proportion of the load. This total load per conductor support varies from 16,000 to 20,000 lbs., depending on wind conditions.

The conductor is a 61 strand cable, consisting of 37 strands of double galvanized plow steel and 24 strands of aluminum, the aluminum forming the outer layer of the cable.

PACIFIC GAS & ELECTRIC COMPANY

BY E. H. STEELE
Engineer of Line Construction

In the pioneer days of power development, the Bay Counties Power Company built what is now known on the Pacific Gas & Electric Company system as the two Bay Lines from Colgate power house



Insulated saddle carrying cable on Pacific Gas & Electric Company's Carquinez towers

to Oakland, a distance of 146 miles, and at that time (which was in the year 1901) was the longest transmission line, when completed, in existence.

The most formidable obstacle in the physical construction of this line was the waterway in general known as San Francisco Bay, which in bringing power from the north, either reaching Oakland or San Francisco, had to be crossed. It was impossible at the high voltages which were required for transmission purposes to carry this power across the bay in a submarine cable. It was, therefore, determined to make an aerial crossing at Carquinez Straits.

The total length of this span from anchorage to anchorage is 6,440 feet. The cables at either end are anchored into a heavy mass of concrete. The line is separated from the ground through very heavy strain insulators, oil insulated, of special design. These insulators have been in service since the original construction in 1901 and have never during the twenty years of service given any trouble.

There are three steel towers in the length of this span which are used under this construction as rider towers only, the permanent anchorage, as described above, being directly to the ground. These towers are known as South, North, and the Leaning Tower. The South Tower and Leaning Tower are approximately 75 feet in height. The North Tower is 225 feet in height. The conductors which were originally four in number (one complete circuit with one spare cable measures 7/8-in. in diameter), are made of 15 strands of plow steel wire having a breaking tensile strength of 200,000 pounds per square inch. The

cables are galvanized. However, for further precautions against rust, these cables are cleaned and painted every third to fourth year. The actual tension to which these cables are pulled is approximately eleven tons, or 22,000 pounds each. About seven years ago two more cables were added to the original construction.

The insulating supports on the towers are made up of nine ordinary 14-inch, four part, pin type insulators for each cable, of standard make, the insulators placed in multiple so as to minimize the strains on each individual unit. The pedestal which is constructed to equalize this load on all the units and which carries the cable directly, is provided with a series of small rollers which permit the cable to travel at the bearing points in order to compensate for the differences in the lengths of the cable between supports, due to contraction and expansion. The length of span between what is known as the North and South Tower (these towers being adjacent to the waterway), is approximately 4400 feet.

PACIFIC POWER & LIGHT COMPANY

(From data supplied by H. H. Schoolfield, Chief Engineer.)

All the exceptional spans on the lines of the Pacific Power & Light Company, Portland, Ore., are over navigable streams and therefore require construction providing for clearance for boat masts. With possibly one exception none of these crossings is subject to ice loading, but all must withstand heavy wind pressures. On one of the crossings some trouble was experienced when solid conductors failed due to crystallization at the insulators caused by

Columbia river span of the Pacific Power & Light Company, length 1994 ft.

wind vibration. This was eliminated by installing stranded cable.

Following is a tabulation of a number of the company's longer span river crossings.

Stream Crossed	Voltage of Circuit	Length of Span, ft.	Crossing Towers No.	Kind	Height, ft.
A—Lewis & Clark River	25000	1611	2	Wood	135
B—Columbia River Hood River	66000	1994–625	3	Steel	95–220–58
C—Snake River	66000	1558–600–500	4	Steel	135–35
D—Columbia River Pasco	66000	1191–1677	3	Steel	153
E—Columbia River Richland	66000	1413	2	Wood	70–110
F—Columbia River Hanford	6600	1240–1454	3	Wood	60
G—Columbia River Beverly	6600	1944	2	Wood	50–70

PUGET SOUND POWER & LIGHT COMPANY

(From data supplied by M. T. Crawford, Superintendent of Distribution)

The longest spans on the Puget Sound Power & Light lines are the Tolt River crossing, 1069 ft.; the Raging River crossing, 950 ft., and the 980-ft. spans

Tolt River crossing of Puget Sound Power & Light Company, span length 1069 feet, duplicate lines, bare solid copper wire.

near Fall City. All sags are pulled up to within elastic limit at O° F., 8 lbs. wind pressure, and ½-inch ice.

The company has on its lines a number of submarine cable crossings operating at 13,800 volts across various waterways in Seattle. The longest of these is 680 ft. Standard specifications are 250,000 C.M., 3 conductor, 21/64-in. rubber insulation on each conductor, ⅛ lead and steel armor over all.

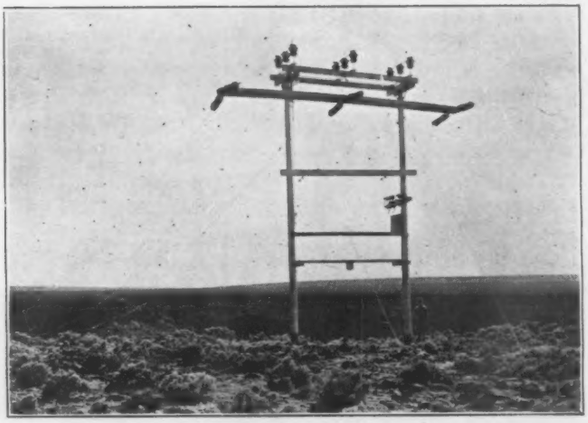
IDAHO POWER COMPANY

BY C. O. CRANE
Engineer

The construction of the high tension transmission system of the Idaho Power Company was commenced in the fall of 1908, when the Emmett-Weiser 66-kv. line was built. On this line there were six long spans ranging from 550 to 1113 feet.

The tower shown in the illustration is the type used on the Thousand Springs-Jarbidge line. This tower has a rotary sectionalizing switch mounted on top. The poles are set on 15′ 6″ centers. The conductors are dead ended on two 5¾″ x 7¾″ x 32′ cross-arms by means of a string of seven disc insulators, spacing of conductors being 15′ 6″. The cantilever sections of the cross-arms are reinforced by a 7¾″ x 6½″ x 7′ 9″ truss block which is bolted between the arms. There are nine long spans on the line, ranging from 1037 to 1590 feet. The span shown in the picture is across the Salmon Falls River Canyon near Castleford, Idaho. The canyon at this point is approximately 400 feet deep. The span between towers is 1590 feet.

On the Thousand Springs-Caldwell 132-kv. line, the poles are set 14 feet on centers. The conductors are spaced 14 feet on centers and dead ended on two 5¾″ x 7¾″ x 20′ 0″ cross-arms by means of two strings of 11 disc insulators. The two strings of disc insulators are connected together at both ends of the strings by means of equalizer yokes. The cantilever sections of the cross-arms are reinforced by a 7″ x 7¾″ x 6′ 6″ truss block which is bolted between the



A 1590-ft. span on the Thousand Springs-Jarbidge line of the Idaho Power Company

arms. There are seven long spans on the line, ranging from 640 to 1340 feet. The conductor used on this line is a 7 strand steel reinforced 4/0 cable. At all dead ends the steel core is separately clamped to the dead end clamp in such a way that the steel core takes the strain instead of the aluminum.

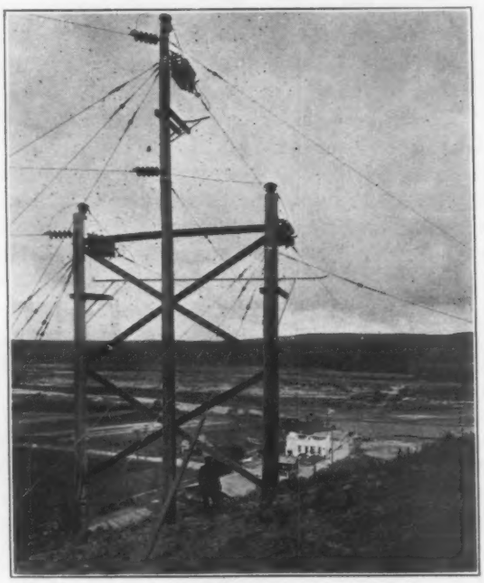
SAN DIEGO CONSOLIDATED GAS & ELECTRIC COMPANY

BY L. M. KLAUBER
General Superintendent

The San Diego Consolidated Gas & Electric Company ordinarily divides long spans into three classes: spans of from 1000 to 1500 feet, 1500 to 2500 feet, and 2500 feet up.

For the purpose of simplification in writing orders and otherwise discussing construction, type letters have been assigned to the various standard forms of anchor towers used. These are as follows:

Type T: Two-pole structure without cross bracing for spans of from 1000 to 1500 feet.



The longest span on the lines of the San Diego Consolidated Gas & Electric Company, stretching 3069 feet across the San Diego River at Mission Valley, with a tension of 8750 pounds in each conductor. Owing to easement difficulties, full advantage could not be taken of the high hills at the sides of the valley, and consequently the span is unusually flat.

Type U: Two-pole structure with cross bracing for spans of from 1500 to 2500 feet, where the adjacent span is less than 1500 feet.

Type V: Two-pole structure with cross bracing for spans of from 1500 to 2500 feet, where the adjacent span likewise exceeds 1500 feet.

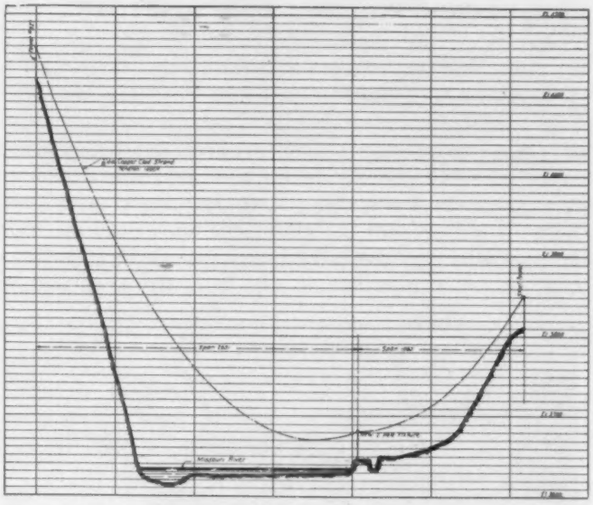
Type S: Three-pole structures for spans exceeding 2500 feet.

The insulators at Type T towers are single strings; at Type U or V structures there are parallel strings, and at Type S structures quadruple strings. Strains are balanced between parallel strings by suitable strain yokes.

MONTANA POWER COMPANY

BY A. C. PRATT
Engineering Department

The Montana Power Company's most interesting span is that crossing the Missouri River near Eldorado Bar. Originally the span had a horizontal length of 3,091 feet, and the reconstructed span has practically the same length but has a steady fixture 2,031 feet from one end of the original span. The original spans were in duplicate with one spare wire



Transmission span over the Missouri River on the Rainbow-Butte line of the Montana Power Company, as modified two or three years ago.

for each; that is, there were eight wires strung from standard transmission towers on twenty-one foot centers instead of ten foot six inch centers, using one standard tower for each two conductors. The transmission lines were rated 15,000 kw. each at 100,000 volts.

In the course of time additional plants were connected until it developed that in case of a ground or short circuit on this transmission line, sufficient current was passed through the span to cause the wires to sag approximately 140 additional feet into the river. This occurred on two separate occasions. On one occasion the wire imbedded itself about 12 in. in the ice and froze in. On the other occasion it went into the water, and on subsequently cooling was raised about 40 feet from the water so as to allow a resumption of service. The steel wire was replaced with 7/16-in., 40% copper clad conductor, and the steady towers were added so as to prevent undesirable swinging in the wind.

Workings of the Farm Settlement System in California

The Constructive Form of Farmer Aid Worked Out by California in its Delhi Settlement Helps Solve Land Speculator Evil and Assists in Permanent Development of the West

BY ELWOOD MEAD
Chairman, Land Settlement Board of the State of California

In private colonization, the settler makes the heaviest payments at first when the earning power of the land is least. Under the state settlement plan as administered by the Land Settlement Board of the state of California, the payments are amortized so that the payments on principal at first are very small and progressively increase. This is more nearly in accord with the farm's earning power than in the private plan. Private colonization requires land to be paid for in from 5 to 10 years. It is impossible to pay for land in this time, and the result is a tragic percentage of failures. People who lose the savings of years go out impoverished and embittered.

Long Time Payments

The settler under the state contract only has to pay 6% a year on his debt. That pays it off in 36½ years, principal and interest. The purchaser under private contract has to pay 6% straight interest and 1/10 of the principal besides.

These long time payments of ours are copied from European and Australian practice. In Ireland, the settler is given 68 years' time, in Denmark, 50 to 75 years, in Germany, 50 years, and in Australia from 31 to 36 years. They are given that long time because experience has shown that it takes that much time to earn the money out of the land. Private enterprise ignores conditions because it makes a more rosy prospect to tell a buyer that he can pay off in 5 years. One system is honest and the other is a fraud, and it is a peculiarly obnoxious fraud because it betrays the kind of development of the kind of people that ought to be protected.

The long time payment of the state enables the money to be earned out of the land, and still gives settlers an opportunity to send their children to school, wear decent clothes, and be free from anxiety.

The state helps settlers organize to cooperate, and thus enables them to buy material used in houses and in equipping farms at wholesale. Private enterprise, with rare exceptions, leaves each settler to shift for himself. The result is that he is penalized by high prices at a time when it bears most hardly upon him.

The Land-Speculation Evil

The social life of the state settlements, however, has a value that has not been fully recognized. During the last century land settlement in this country has been speculative. People rarely buy a farm with the idea of living on it for a lifetime and then having it the home of their children and children's children. They expect to sell out and move on as soon as land values rise; they are indifferent about neighbors or community life.

We must create in this country a community spirit to end the speculative spirit. When I was in Australia, very few Americans who came there bought farms because they were required to live on them eight months in the year for at least twelve years. One and all said they had come over for a quick turn. They didn't propose to stay. In our Durham and Delhi settlements we are continually having requests from people who want to buy farms without living on them, and who are asking what we think the land will be worth when it is developed, and whether they will be allowed to sell. We have had opposition to the enforcement of the clause requiring residence to be established within six months by people who state in their application they wanted the farm for their own use, and who knew that their application meant taking it away from some one else who would live on it. That migratory speculative poison must in some way be driven out of American rural development.

The Social Stimulus

The speculative opportunity in land buying does not exist today. Land prices are higher than they should be. There are few sections of this country where farms are earning interest on the existing price. The discontent of the land-owning farmer shows that industry and effort in farming do not pay as well as in other lines. To earn the money needed to buy a farm is, therefore, a long and difficult undertaking. It requires a persistence and economy and self-denial so unusual that few people have the qualities to succeed in the undertaking unless their morale can be strengthened by a community spirit and encouragement. That is what the state land settlements give and that is where private colonization fails.

The cooperative stock breeders' association, cooperative milk selling, cooperative buying, and cooperative social activities keep up the courage and hope of state settlers. They are engaged in a common adventure, in close personal contact with each other.

In the last 20 years the movement of well-to-do farmers into towns, and the buying of farms by city people as an investment, is causing a deplorable social separation in country neighborhoods. The non-resident owner, the tenant, and the farm laborer each have a different social status. Not only is the struggle to get on in the world being made much harder, but the native values of rural life which are needed to make it a training school for democracy are being sacrificed. The people of California who live in the country are beginning to realize this.

Farm Savings Are Made Possible by the Use of Electricity

Facts and Figures on Comparative Costs and Farm Economies Effected by Electricity in Western Agriculture. What One Three-Horsepower Motor Accomplishes on a Colorado Ranch

BY REGINALD TRAUTSCHOLD
Engineer, The Society for Electrical Development, Inc.

Nearly half of all industrial power is now electric, and very nearly all industrial lighting. In the case of the farms, on the other hand, it is estimated that not more than 7 per cent of them are provided with electric light and power, and this despite the fact that as recently as 1917 about 35 per cent more power was used in farming than in manufacturing. More than half the farm power, furthermore, was then furnished by animals—a good horse being rated at 7/10 horsepower — able to develop their full quota not more than a few hours each day. These general and to some perhaps apparently irrelevant statistics are advanced simply to bring out the very decided backwardness of the farmer in adopting the service which has been so largely responsible for the tremendous strides made in manufacturing lines.

One small motor (3 hp.) on a Colorado farm pumps all the water for 3,500 sheep, 27 cows and 50 hogs, drives a milking machine used twice a day to milk 20 cows, operates the cream separator and the corn grinder, and drives a cucumber-seed cleaning machine in spare moments.

It would require some decided stretch of the imagination to picture animal power operating the water supply system of a factory, and turning the various mechanisms employed in fabricating the product, while the establishment was lighted by oil lamps; but would such a condition really be very different from the very general failure to use electricity on the farm for lighting, running separators and churns, pumping water, turning the much-used grindstones, and for the numerous household appliances—washing machines, vacuum cleaners, flat-irons, electric fans—which are just as desirable on the farm as in more thickly populated communities? Seven per cent of the six and a half million farms in the country today have found this to be true, for in not a single case in which electricity has been rationally made use of on the farm has it proved anything but highly effective, economical and actually essential from the standpoint of efficient and low cost farming.

It is generally conceded that a good horse can do seven times as much work as the hired man on the farm, but the horse has a working capacity of about ½ a kilowatt—the electrical unit for power with which nearly all are now familiar and by which its consumption is measured. Furthermore, the horse will not deliver the ½ kilowatt of work for more than an equivalent of three hours in a twelve-hour day. The electric motor, on the other hand, can work to its capacity every minute of the twelve hours, so that the 1 kilowatt can perform the work of eight horses, or fifty-six hired men, during the farm day. That is, 12 kilowatt-hours represents a day's work for eight horses or fifty-six men. As a kilowatt will cost from 3 to 10 cents, the cost of electricity consumed on the farm during a twelve-hour day will be from 36 cents to $1.20. Electricity as a farm hand makes Chinese coolie labor with its reputed wage scale extravagantly high. For such labor to compete on equal terms with electricity, the wage scale of the coolie would have to fall between less than two-thirds of a cent and slightly over two cents a day.

In terms of power capacity, a good horse will cost from 20 to 25 times as much to keep in good condition.

The wonderful economies—to say nothing of the conveniences and comforts—in farming made possible by the present electrical development, entail, however, a supply of electricity on or to the farm, and here again it is well to turn to the experience in industrial manufacturing for guidance. The manufacturing plant either secures its electric power from a central station—paying only for the power it actually consumes—or operates its own power plant. It is a much disputed question, and will probably always remain a matter of controversy, whether central station current or that generated by the private (isolated) plant is the more economical in manufacturing activities. Very much the same question arises in connection with the use of electricity on the farm. Will it cost less to buy the electricity from a central station or to install a small generating plant on the farm? Usually, the purchase of electricity will prove the more satisfactory and less costly, and will provide that almost unlimited expansion which will be found to be highly

desirable when the economy, convenience, safety and comfort of electricity on the farm is appreciated from actual experience.

A very large number of farms not now supplied with electricity can be reached from cross-country high-voltage transmission lines. Tapping these lines of supply entails more or less expense, it is true, and the willingness of the central station owners to have branch lines extending into comparatively thinly populated sections is a matter which requires rational and cooperative action between the farmers and the power companies. If farms near the main transmission lines draw upon the electrical supply, those a little farther removed can be supplied without great outlay on the part of either the central station or the farmer consumer; then those still farther removed, and so on.

The cheapest electricity procurable is that from the large hydroelectric developments which are continually harnessing more and more of the vast water powers throughout the country; so if there is a stream on a farm which has to install its own electric plant, the cheapest installation is a water wheel and generator (dynamo), supplemented perhaps with a storage battery to store the excess of electricity when not needed, and to furnish the reserve capacity when the demand is high, which the normal output of the installation may lack. These small hydroelectric developments on farms present no great difficulties, if the water supply is adequate, but require some ingenuity and a certain amount of engineering talent.

Farm Light and Power Sets

Where neither central station service nor a suitable stream for operating a water wheel and dynamo is to be found, and of course there are many thousands of farms not so favored, an engine of some sort must be installed to drive the electric dynamo—usually an internal combustion engine operating on gasoline, kerosene or other volatile liquid. Progressive manufacturers have evolved numbers of compact and relatively efficient farm sets for lighting and power supply which are simple to operate and bring the conveniences, comforts and to a lesser extent the same economies to the most remote and isolated farm. The qualification of the economy to be realized from such farm sets does not mean that they are expensive to run, or that they are not decidedly economical in comparison with any other form of farm power but simply that greater net economy can be secured if the mains of a large central station can be tapped.

The farm sets, sometimes rated in the number of electric lights they will maintain—i. e., in lamps—consist of the necessary engine dynamo, a switchboard, and usually a storage battery reserve, and generate electricity at 32 or 40 volts. When the high power transmission lines of the power companies are drawn upon, the current has to be stepped down by a transformer to a safe voltage—standard at 110 volts for lighting and light power purposes, though for heavy power consumption a voltage of about 220 volts is to be recommended. The difference in voltage is the chief difference—other than that one is direct and the other alternating current—between the current furnished by the farm set and the central station. This one point is mentioned for the reason that the leakage of electricity in wire connections is about nine times as serious at the lower voltage than at 110 volts. It is the part of wisdom, consequently, to use the central station current whenever possible, or to install one of the larger farm sets generating current at 110 volts.

Power Requirements of Farm Equipment

Farm sets and the chores on the farms which can and should advisably be done electrically, have been so often featured that it would seem of greater interest and prove of more constructive value to record, first, what is the electric power required to operate a few of the various types of machines and equipment used largely on the farms, and second, what is the extent of the chore which an electric kilowatt—costing from three to ten cents—will accomplish. The accompanying tables present such information and the economies cannot well fail to surprise all who have not used electricity, or who have not given the use of electricity on the farm due consideration.

AVERAGE POWER REQUIREMENTS IN KILOWATTS

Cream separators	0.10— 0.75
Milking machines	0.37— 4.00
Butter churns	0.10— 2.00
Bottle washers	0.12— 0.75
Water pumps	0.20—75.00
Washing machines	0.12— 1.50
Vacuum cleaners	0.05— 0.10
Grindstones	0.12— 0.75
Wood saws	1.50— 7.50
Corn shellers	0.37—10.00
Shredders	7.50—15.00
Ensilage cutters	7.50—20.00
Feed grinders (small)	2.00— 7.50
Feed grinders (large)	7.50—22.50
Threshing machines	7.50—50.00
Hay balers	2.00— 7.50
Hay hoists	2.00—10.00
Wood splitters	0.75— 3.00
Oat crushers	1.50— 7.50
Lathes	0.10— 0.20
Sewing machines	0.02— 0.03
Buffers and grinders	0.02— 0.03
Ice cream freezers (large)	0.10— 0.20
Centrifugal dryers	0.75— 1.50
Mangles	0.20— 0.75
Meat grinders	0.20— 0.60
Sausage stuffers	0.37— 0.75

What Electricity Can Do

It has been found that electric lights in the hen house will stimulate laying 50 per cent during the dark winter months. Picking fruit by electric light after 9 p.m., that the temperature of the fruit might be such at the time of picking as to maintain the quality of the fruit during transit to Europe, was successfully resorted to during the war. Cow barns with electric fans to keep Bossie cool in the summer, and for ventilation in the winter, are no longer novelties. These and many other special uses for electricity on the farm could be enlarged upon, but probably an account of the chores done by one small three-horsepower motor out in Colorado will prove of even greater interest.

This little farm hand, without being overtaxed, pumps all the water for 3,500 sheep, 27 cows and 50 hogs, drives a milking machine used twice a day to milk 20 cows, operates the cream separator which handles the entire milk supply, and operates a corn grinder twice a day as a regular share of the work.

What a Kilowatt Will Do on the Farm

Operate a 16-candle-power lamp for about a month.
Operate a 6-lb. flat-iron for two and a half months.
Do a wash equivalent to twenty sheets weekly for about two and a half months.
Operate a vacuum cleaner long enough to clean over 1/10 acre of carpet.
Operate a water pump long enough to raise 100 gallons 1,000 feet.
Run a sewing machine for some 20 consecutive hours.
Drive an electric fan four hours a day for nearly a week.
Brew with an electric percolator 2½ gallons of coffee.
Operate a heating pad as a bed warmer for from ½ a week to a week.
Run a domestic buffer and grinder five hours a day for three days.
Operate a chafing dish a quarter of an hour a day for more than a week.
Operate a foot warmer five consecutive hours.
Make 100 slices of toast.

In addition, during idle minutes, it drives a cucumber seed cleaning machine.

On a farm near Lancaster, Pa.—one of 160 acres and indicative only of what can be done in the way of using electricity on almost any farm—there are twenty-nine electric lights in the house proper, four in the cellar and three on the porches, and four 3-way switches controlling the lights in the spring house fifty or sixty feet distant from the house and also the lights in the main barn some hundred feet from the house, by wires laid underground. The spring house is supplied with plenty of light and contains a small one-horsepower electric motor for operating the milk separator, churn, grindstone, etc. The pig stable is electrically lighted with 3-way switches at the doors; an automobile shed contains the electric meters—the current is purchased from the central station—and two lights, while the main barn contains twenty-seven lights—eight on 3-way switches and six in the upper story and feed room. In the feed room is a 15-horsepower slip-ring motor capable of starting a 30-horsepower load which is used to grind feed, shell corn, break cobs, cut and bale hay, run a threshing machine, fill the silo, and run a cement mixer, and at other times run a hoist for unloading hay, and operate the sheaf elevator for unloading wheat. A steer barn—ninety feet long—is provided with three electric lights on a 3-way switch.

For the convenience of the farm wife, a one-sixth horsepower electric motor is installed in the cellar, and used for running the washing machine, and can be carried about and attached to any convenience outlet or light socket for the operation of other household appliances. Among the latter which are in frequent use may be mentioned an electric iron, a vacuum cleaner and a small electric stove. So convenient is this baby motor that at times it is taken to the barn to clean seed wheat.

Economy, Safety and Convenience

This farm is very favorably situated for obtaining reliable and relatively inexpensive service from the central station. In 1916, the rate charged for lighting service was 10 cents per kilowatt and for current to be used for heating and power purposes, 4½c. per kilowatt. The average monthly bill based on such rates was for light $2.34 and for power service $4.75.

The electric motor is more reliable than any other type of power mechanism, for there are fewer parts to get out of order, only two bearings to oil occasionally, nothing to be affected by frost, and practically no attention is required. It starts at the touch of a button or switch in any weather—winter or summer—requires no fuel or water and can be instantly controlled from any distance. It can be made to work automatically in pumping water and in many other operations, and it has a more constant speed than gas or oil engine. It weighs only three-fourths as much as an equivalent gas engine, will carry a very much greater overload capacity for a short period, and can be obtained in all sizes.

With all these and many other advantages and economies favoring the use of electricity on the farm, it can only be a relatively short time before the more progressive of the thirty million people—about one-third of the entire population of the country—living on farms, will adopt the service as an absolute necessity, and so secure for themselves many of the comforts and conveniences which have heretofore been lacking in life on the farm.

ELECTRIC PUMPING INCREASES CROPS

Not only is electric irrigation essential to the development of great areas of arid land above the level of gravity irrigation, but more and more the land which has been dry farmed in such regions as Colorado, Montana and the Northwest, is being taken over for irrigation. An idea of the increased crops obtainable and the inducement for the use of the electric pump is indicated by the following crop returns from the state of Washington.

CROP	Unit	On non-irrigated land	Average	Per cent of average on non-irrigated
Oats	Bu.	19.2	36.7	191.1
Cereals:				
Corn	Bu.	41.9	46.7	111.4
Winter wheat	Bu.	21.1	18.0	85.3
Spring wheat	Bu.	12.6	25.9	205.6
Barley	Bu.	26.1	33.6	128.7
Rye	Bu.	5.4	10.4	192.6
Hay and forage:				
Timothy alone	Tons	1.5	1.9	126.7
Timothy and clover mixed	Tons	2.1	2.1	100.0
Clover alone	Tons	2.1	1.8	85.7
Alfalfa	Tons	2.0	3.3	143.5
Other tame grasses	Tons	1.6	2.1	131.2
Grains cut green	Tons	1.1	1.3	118.2
Wild, Salt, or prairie grasses,	Tons	1.1	2.0	181.8
Corn cut for forage	Tons	1.5	3.0	200.0
Silage crops	Tons	6.6	9.0	136.4
Root crops for forage	Tons	9.5	4.2	44.2
Vegetables:				
Potatoes	Bu.	92.4	186.4	201.7
Sugar beets	Tons	8.4	8.7	103.6
Fruits:				
Grapes	Lbs.	*7.3	*11.9	163.0
Apples	Bu.	†2.0	†3.4	170.0
Peaches	Bu.	†1.5	†2.1	186.7
Pears	Bu.	†1.5	†2.3	153.3
Plums and prunes	Bu.	† .8	†1.7	212.5
Miscellaneous:				
Red clover seed	Bu.	1.8	4.4	244.4
Hops	Lbs.	1197.7	1717.5	143.4

*Yield per vine. †Yield per tree.

The Pacific Salmon Challenges the Hydroelectric Engineer

The Habits of the Western Salmon and Ways and Means of Solving the Peculiar Problem He Creates Where Power Plants Are Located on Salmon Rivers

BY H. W. CROZIER
Electrical Engineer, Sanderson & Porter

Salmon, swimming in the Klamath River, have put California hydroelectric engineers on their mettle with a new problem wherein they are challenged to provide for the salmon's continued existence after the completion of the proposed high dams. Fishways for surmounting the dams, ways and means to get the baby salmon down after their parents have ascended, and the necessity of pronouncing "oncorhyncus tschwytscha," the ferocious scientific name

East approach on fishway over the Portland Railway Light & Power Company's dam on the Willamette River, at Oregon City. The large pools on the main waterway, where the salmon can rest, are from 15 to 20 feet wide. The great salmon fishing industry of the Northwest makes the fishway an important consideration for the engineer who is planning hydroelectric developments in this region.

the salmon uses, are specimens of what confronted them, when descending from hydroelectric triumphs in the Sierras above the range of the salmon, they were planning a hydroelectric project on the Klamath.

Substantial progress has been made in salmon fishway design for overcoming high obstructions in the streams of Oregon and Washington, but the problem presented by the construction of a great dam in a river supporting a commercial run of salmon has not been previously attacked. That it would prove insurmountable the engineers would not admit, remembering the long list of difficulties which had been overcome in developing the hydroelectric art to its present high level, and in which California engineers and scientists had taken a prominent part.

Studying the salmon's natural history has added an interesting chapter to the hydroelectric note books, and the plans for assisting the salmon in surmounting the high dams as outlined to the Federal Power Commission are believed to represent the last word in this novel subject.

The Career of a Pacific Salmon

Pacific salmon found in the rivers emptying into the Pacific Ocean from San Francisco Bay northward, in California, Oregon, Washington, British Columbia, Alaska, Siberia and Japan, are a distinct genus (oncorhynchus), and essentially different from the salmon of the Atlantic Ocean (salmo salar). They live most of their lives in the ocean, and only enter the rivers when their spawning migration instinct impels them to seek the spawning beds near the headwaters. Mature Pacific salmon eat nothing when on the spawning migration in fresh water, and therefore seldom take a fly. After spawning once, all die, both male and female. The Chinook salmon, he of the ferocious scientific name, also known as Sacramento River Salmon, is the principal salmon of California rivers, and is hatched from eggs laid by his parent near the headwaters. He descends to the sea during the first six months in his life and lives usually four years in the ocean. The great majority of the salmon return to their parent stream to spawn in their fourth year, a few during the fifth and sixth years, and rarely a specimen has been taken seven years old. Some precociously developed fish, smaller than normal specimens and practically always males, return during the first, second and third years.

Little is known of the life of the salmon in the ocean, except that he has abundant food, as he grows rapidly, and is a beautiful and fat fish when caught swimming at sea or when returning in the river estuaries. To the painstaking efforts of the biologists who have studied salmon is due the large fund of information on his habits in fresh water, and the remarkable discovery that the salmon's scales retain a record of his life history. Enlarged photographs of salmon scales show rings similar to the finger print records used by the police, and the life history of the salmon may be read with accuracy. The six months as a fry in fresh water, or perhaps eighteen months if he loitered in the river over a summer, are indicated quite clearly in a central nucleus, each of his four years in the ocean are clearly shown by heavy bands or series of rings, and further facts may be determined with surprising precision; for instance, if the salmon happened to be one of the few hatchery-raised fish who survive, this fact is indicated by an abrupt break in the record on the

scales, representing probably the transition from protected to wild conditions.

Commencing in June and continuing until December, the spawning migration of the salmon reaches a maximum in September in most California rivers, the fish actuated by what appears to be an irresistible migration instinct to ascend to the headwaters of rivers. Nothing save vertical falls stops them, and they jump low falls, run the fastest rapids and persist in spite of profound injuries. Entering the river from the sea, fat, sleek and beautiful, they are seen on the spawning grounds emaciated, with jagged cuts from rocks, torn fins and tails, and generally unfit for food. Their stomachs are empty and shriveled.

The Salmon's Right-of-Way

As a salmon is a large active fish, several feet long and sometimes attaining the weight of ninety pounds, necessarily fishways for his accommodation must be of substantial size. One type of fishway that has been used consists of a deep flume six feet wide divided into six-foot boxes by partitions which have a two-foot notch arranged for spilling water from each box to the next. From eight to ten second-feet of water is required. A better way, however, is to construct the fishway as a series of pools, water spilling from one pool to the next; as thereby, when the physical conditions permit, pools of large dimensions may be obtained with moderate expense. The secret of success with fishways for salmon is to make them of ample size with plenty of water, and to provide frequent extra large pools for resting purposes.

Fly-fishing, for which an innumerable variety of lures is available, is considered sport; but it is nothing to the sport the fishway-engineer has in devising his fishway entrance to entice the salmon to enter, for which purpose he has three lures. One of these is the salmon's migrating instinct, which has been touched upon in describing how energetically he overcomes all obstacles in reaching the spawning grounds; another is his instinct to return to his parent stream, this being a well accepted theory of the biologists, which explains that the salmon returning from the ocean to spawn always tends to seek the stream in which he was born; and third is the salmon's instinct or liking for aerated water, which as a French scientist has pointed out is one of the strong impulses which actuates the salmon in his migration.

The great dam to be located just above the confluence of the Salmon River on the Klamath River has several natural advantages favorable for the location of a fishway, principally because there is a saddle a short distance away from the dam which will be used for spillway purposes, and where the fishway can be built on a long, easy grade from the water. By taking advantage of the natural slope the engineers may, by building small dams or walls, form large resting pools at frequent intervals. To entice the salmon into the fishway, a big basin adjoining the river is to be the entrance to the fishway. Into it will tumble all the waters from the spillway, and several cascades will be arranged to aerate the water highly.

Our friend, the salmon, coming up the Klamath will find a good stream of water, highly aerated, falling into the river from this fishway basin, and most of the year this stream will be at least half of the total flow. He will be attracted to investigate, and with a flash of gleaming silver, over he goes into the big pool. Such water should suit him well, as it comes from his birthplace up the river, or from his parent stream.

His only way out is up the fishway, containing highly aerated water from cascades, and after amusing himself for a while jumping into the spillway

View of the fishway on the Portland Railway Light & Power Company's eighty-foot dam, located at the River Mills power house on the Clackamas River.

water which also cascades into the pool, he has no choice but up the fishway he goes. As he might get discouraged presently, jumping from box to box of the fishway, the big pools permit him to rest, and presently he will continue to advance through the alternating fishway sections and resting pools till he reaches the top of the dam and the great lake above.

The resting pools are very important. Salmon jumping are said to get discouraged after awhile; and the resting pools, giving variety, are the secret of success in surmounting high lifts.

Headed For the Power House

The little fry coming down stream fortunately do so in great numbers at the end of the winter and in the spring when the water is high. Gently dropping down the stream with the current they presently come to the placid waters of the great lake and must swim to progress in the gentle current. As they feed on insects and grubs, they keep close to the surface, but travel mostly at night to avoid bird enemies, unless it is very cloudy. Consequently they are always within the influence of the surface currents setting toward the spillway. Coming near the dam, they presently sense an increasing current and gradually get into the spillway and descend with the water to the river below without injury, as the spillway is a series of short cascades, without any sheer drop. As they swim near the surface, they avoid altogether the entrance to the great tunnel fifty feet

below the surface through which the water rushes to the mighty turbines.

If perchance the fry should get entangled in the current to the rapidly whirling turbines, no harm would result, as the water flows through the very large, smooth water passages of the turbines in an unbroken stream, a result modern turbine designers have attained in striving for high efficiency. Unless unlucky enough to impinge on the point of one of the vanes, the fry whisk through without injury. Salmon fry in great numbers were pumped through the pumps of the Glenn-Colusa Irrigation Canal last year without apparent injury, and fish do not seem to be affected by considerable pressure, as witnessed by the many authenticated cases of regular passage through inverted siphons under heavy pressure, as well as by their behavior in Lake Tahoe and in the sea when hauled out from great depths by fishermen.

Screening the small fry from irrigation canals has proved difficult because of their habit of gently drifting down stream with their heads to the current. Naturally they enter any screen tail first. In hydroelectric practice, conditions are markedly different because of the still water of the large lakes behind the dams and the considerable submergence which can be given to the intake tunnels.

The ultimate result of the salmon's challenge to the engineers will be the development of the fishway in California to meet the demands of the hydroelectric art. The construction of the dams will result in adding to the Klamath - Sportsman's Paradise great lakes full of trout, with improved accessibility via the railways which must be built for construction purposes; and, last, but most important, the development of several hundreds of thousands of hydroelectric horsepower for the industrial development of California.

Why Not Revive the Former Pig Iron Industry of Oregon?

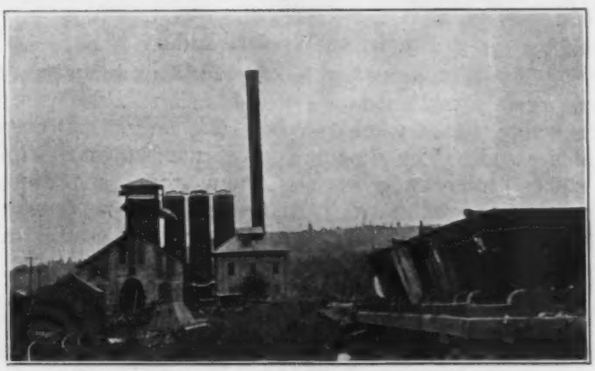
Reasons Why This is a Good Time to Start Again a Basic Industry of the West Whose Early Failure Was Due to an Unfortunate Combination of Circumstances

BY WILLIAM H. CRAWFORD
Manager Industrial Bureau, Portland Chamber of Commerce

It is not generally known that as long ago as 1867, pig iron was manufactured at Oswego, Oregon, twelve miles south of Portland on the Willamette River. This probably marks the beginning of the iron industry on the entire Pacific Coast.

The Old Stone Furnace

The little, old stone furnace stands today as a landmark, and very few who pass that way realize for what purpose the quaint structure was built.



A distant view of the plant of the Oregon Iron & Steel Company, constructed in 1888. In the foreground is one of the ore cars used on the narrow gauge line to the mines.

When informed that it is a twenty-ton charcoal iron furnace, and that for eighteen years it operated on a profitable commercial basis, one naturally asks, why did this industry die out?

Old trails lead to the abandoned mine workings, which have long since caved in or filled with water. And what is even more surprising, less than a mile north of the old stone furnace stands a monumental wreck in the shape of a more modern blast furnace with towering steel stack, buildings and equipment that suggest a corner of the Pittsburgh district. The machinery name plates show that this one hundred-ton blast furnace was built in 1888. Why is it a wreck today, and why was it ever built?

Moving Into Larger Quarters

In the records of the Oregon Iron & Steel Company, some interesting history is disclosed. The original Oregon Iron Company was incorporated February 23, 1865, with capital stock of $200,000. The first pig iron was made on August 24, 1867. One transfer of the property was made in 1878 to the Oswego Iron Company, and a second transfer in 1882 to the Oregon Iron & Steel Co. Up to November, 1885, over 40,000 tons of pig iron had been made in the original furnace.

The Oregon Iron & Steel Company was capitalized at $1,500,000. Because of the great success attending the operation of the original twenty-ton stone furnace, the owners decided that the time was ripe to go into the business on a large scale. They sent east for the best men they could hire. On the recommendation of the eastern experts, these Oregon pioneers were induced to build the most modern, up-to-date plant that money could buy at the period of its construction. They felt that they were building for the future, and had the courage of their convictions. Construction of the new plant began January first, 1888.

The Story of a Failure

From a twenty-ton output using charcoal fuel, they jumped to a one hundred-ton output. Then their troubles began. The business that was so suc-

cessful when handled through the little old stone furnace quickly terminated when transferred to the big plant close by. Most of the reasons are very apparent. Overhead expenses were increased to a ridiculous total. The market demands did not begin to call for the full capacity of the new blast furnace.

About the same time, a financial depression swept over the country, and the price of pig iron

The old stone furnace built in 1866, Oregon's first venture in the production of pig iron.

dropped so that the eastern product was dumped on the Pacific Coast far below the cost of manufacture at the new plant. On top of this, difficulties were experienced with the ore supply, in that conflicting property interests brought about a law suit so that additional ore bodies had to be opened. Also, the quality of the ore had deteriorated to such an extent that it required twice the normal amount of charcoal per ton of iron as compared with standard charcoal iron furnaces. The physical condition of the new ore bodies made the percentage of "fines" so large that dust explosions causing damage and loss of production made economical operation impossible without expensive re-design of furnace.

The record shows that the new plant operated at a loss from the day it started, and that within five or six years, the orders came to close down. The shut-down has now lasted for about thirty years, in which time, of course, the plant has gone to almost complete ruin. However, the big question of the manufacture of pig iron in Oregon is again a live issue.

A Mistaken Generalization

The remains of this stupendous undertaking, coupled with the knowledge that heavy financial interests were behind the original enterprise, have led to the popular belief that the manufacture of pig iron here must be economically unsound. If these wealthy families could not make it go, who could succeed?

But the failure was due in large part to poor business judgment plus unfortunate temporary business and operating conditions; reasons very readily understood, and when properly analyzed, standing in no way against the manufacture of pig iron as a basic Oregon industry. The same thing has happened many times in other lines of business, but in spite of a remarkable increase in the price of pig iron (without a corresponding increase in the cost of production) we have up to this year of 1921 failed to see a revival of this important industry in the Columbia River Gateway country.

A Field for New Enterprise

The old ore bodies that justified the Oswego operation are known to extend through the hills behind Portland and down the Columbia River, through Columbia county, a distance of nearly fifty miles. Most of this country is heavily timbered and it is only in odd spots that any amount of prospecting has been done.

During the last year, a group of local men, with some eastern capital, have been carrying on considerable development work at points where the outcropping seems to indicate large measures of iron ore. Spots were selected where operating costs would be at a minimum, and where analysis showed the percentage of iron high enough to justify the investment in a small furnace.

Most of this work had been in the vicinity of St. Helens, which is less than thirty miles west of Portland, on the Columbia River. Several large ore bodies have already been blocked out, and the iron appears as 54% (average sample) limonite. A prospective furnace location is close to St. Helens, and bids are now being received on a fifty-ton charcoal iron furnace for an initial operation. It is reported that the timber refuse from logging operations will be converted into charcoal, and that charcoal iron will be manufactured until such time as an adequate coke fuel supply is developed.

A Promising Western Industry

The time seems to be ripe for this industry to be again established on a sound basis that will carry through times when markets are normal or even depressed. The Pacific Coast uses upwards of 100,000 tons of pig iron per annum, which at present prices—approximating $30.00 per ton—represents millions of dollars of western money that go to the eastern mills and transportation companies.

With proper conservatism in the original investment, this revival of the manufacture of Oregon charcoal iron should gain a strong foothold, and should gradually expand into surrounding territory north, south and east. Portland is already well established as an industrial center, with the mechanical products occupying a prominent position. The raw material supply for this industry lies close at hand, labor conditions are ideal, transportation facilities and distributive advantages have already been proved at this point on the Columbia River to justify the optimism of those who are now endeavoring to take up the manufacture of pig iron, thirty years after the shut-down of the old Oswego blast furnace.

Study Course

For the Contractor-Dealer, and the Business Man in the Small Industrial Plant

University Accounting Course — X

Double-Entry Theory — The Ledger and the Journal

BY PAUL B. KELLY

The multiplicity of accounts that are kept, even in a small business, makes it advisable to assign each account a page, or several pages, in a specially prepared book. This book is called the General Ledger and, more often, **the** Ledger. It is worth while to repeat the definition of the Ledger.

The Ledger is a collection of all the accounts necessary to make a complete exhibit of Assets, Liabilities, and Net Worth.

Observe that the definition does not say that the Ledger is a book. **The Ledger is really the accounting equation.** It might be operated on a single sheet in the skeleton form used in earlier lessons. It is more efficient, however, to keep it in book form. The book is merely a means to an end. Keep the fact always in mind that you are constantly dealing with the accounting equation. Books and forms are nothing more than the tools with which the accountant works.

The ledger is the vital part of the accounting system. All business transactions are reflected in it eventually. If you understand the nature and function of the ledger you will have no great difficulty in operating the Standard Accounting System. The special forms which it uses are either, memoranda of transactions, or, sheets used for making preliminary totals of these memoranda as a basis for summarized entries to the ledger.

The advantages of the book form of ledger are:

1. Each account can be assigned a number of pages in the book proportionate to its needs.
2. The ledger page is larger and is specially ruled so as to show additional information.
3. It reduces the number of errors made by posting entries to the wrong accounts. If the skeleton form of ledger was used it would necessitate an extremely large sheet with a great many columns. Many mistakes would result from entries in the wrong column.

Gathering the Data for the Ledger

It is manifest that every time a sale is made or a sum of cash is received from a debtor, it would be impracticable to get out the ledger and make a double-entry. Also, it is evident that unless a memorandum of each transaction is made at the time when it occurs, some transactions will be entirely forgotten and will not be reflected in the ledger. Special forms, therefore, are devised on which the necessary memoranda is made quickly and accurately. These special forms are so designed that they accomplish other objects in addition to furnishing the data for the ledger in the most convenient form. These special memorandum forms include the Job Envelope, Cash Sales Tags, Customer's Bills, Cash Receipt Tags, Check Stubs, Invoices, etc. The exact use of these forms in recording the necessary information was explained in the first four lessons of this course in a section called "Gathering the Preliminary Data." You now understand the significance of that title.

The Journal

The isolation of each account on its special page in a book form of ledger creates a very practical difficulty. In the book form of ledger the debit element of a double entry gets placed in one account and the credit element is entered in another. After the entry is made and forgotten for a time, it becomes difficult to link them together again if the necessity arises. Such a necessity does arise when the Trial Balance points out that an error has been made. It sometimes becomes necessary to check each debit against each credit in order to locate the error.

In order to obviate this difficulty, a permanent record of each double-entry is made before it is entered in the ledger. This permanent record of entries is known as the Journal. The definition that is usually given of the Journal is as follows:

The Journal is a chronological record of transactions expressed in terms indicating the entries to be made to the Ledger.

The journal is used for two reasons:

1. To guarantee the equality of debits and credits before the entries are made in the ledger.
2. To expedite the discovery of errors made in posting the ledger.

The act of making the entries in the ledger that have first been recorded in the journal is called "posting."

The following is a sample of the journal form used in the Standard Accounting System. Notice that the page is divided into a debit and a credit side. This form is 9″ x 14″ in size and is printed on loose-leaf sheets that are kept in a binder provided as part of the Standard Accounting set. The date of the journal entry is placed above it on a separate line.

DR. JOURNAL CR. Page 1

MDSE.	GENERAL LEDGER	ACCOUNTS PAYABLE	ACCOUNTS RECEIVABLE	FOLIO	NAME	NAME	FOLIO	ACCOUNTS RECEIVABLE	ACCOUNTS PAYABLE	GENERAL LEDGER	MDSE.
					January 1st	to 31st, 1920					
	2000—			198	Cash	Accounts Receivable	184			2000—	
					January 1st	to 31st, 1920.					
	1500—			155	Merchandise	Accounts Payable	240			1500—	
					January 1st	to 31st, 1920.					
	3000—			240	Accounts Payable	Cash	198			3000—	

The numbers of the ledger pages to which each journal entry has been posted are entered immediately in the columns provided for this purpose on the debit and credit sides of the journal form. The entry of the ledger page numbers in the folio columns indicates that the entry has been posted to the ledger. These ledger page numbers also serve as a valuable cross-reference and make it convenient to check the posting of the journal entries quickly if this becomes necessary.

The ledger pages are cross-referenced in a similar manner. On the same line of the ledger page on which the debit or credit is written, the date of the journal entry and the journal page number are entered. By means of this reference, the debits and credits appearing in any account may be readily compared with the original journal entries. The debit and credit elements of each transaction are thus closely linked together in the records.

In order to make this posting procedure perfectly clear, the ledger accounts to which journal entries illustrated above were posted are here presented. Trace each journal entry to the ledger accounts and note particularly how the records are cross-referenced.

CASH Page 198

Jan	1	Balance			2180	Jan	31		J1	3000
"	31	Rec'd on Acct	J1	2000				To Balance		1180
					4180					4180
Feb	1	Balance			1180					

ACC'TS REC. Page 184

Jan	1	Balance			4500	Jan	31	Cash on Acct	J1	2000
								To Balance		2500
					4500					4500
Feb	1	Balance			2500					

MDSE ACCT Page 155

Jan	1	Balance			6000					
"	31	Purchases	J1	1500				To Balance		7500
					7500					7500
Feb	1	Balance			7500					

ACC'TS PAY.

Jan	31	Paid by check	J1	3000	Jan	1	Balance			4440
		To Balance		2940	Jan	31	Mdse on acct		J1	1500
				5940						5940
					Feb	1	Balance			2940

NET WORTH

						Jan	1	Balance		8240

TRIAL BALANCE Jan.31.1920

Cash	1180	
Accts Rec	2500	
Mdse	7500	
Accts Pay		2940
Net Worth		8240
Totals	11180	11180

Notice the method used in totaling and balancing each ledger account. The lines used in the footings are always drawn with red ink. The first single line is a signal that an addition is to be made. The totals are then placed below this line. Beneath the totals, double red lines are drawn. The double red lines indicate that the footing on the debit side is equal to the footing on the credit side. Their significance is the same as that of the = sign used in the accounting equation.

The "To Balance" figure shown in each account is obtained by first footing each side in pencil figures, and by then finding the difference between them. The "To Balance" figure is the amount that must be added to one side of the account to make it equal to the other side. After this figure is inserted the account balances. The "Balance" of the account is brought down on the proper side below the double red lines. It is, of course, always equal to the "To Balance" figure, but always appears on the opposite side of the account.

This system of bringing down account balances should be rigidly followed because it necessitates a re-check of the figures. Little errors that waste time are thus prevented.

Indexing the Ledger

The number of pages in the ledger that should be assigned to a particular account depends upon the number of entries that probably will be made to it. There are 284 pages in the ledger provided as part of the Standard Accounting System. The space in this ledger should be allotted in proportion to the needs of each account.

The accounts should be arranged in the ledger in the same order in which they are listed in the Summary of Operations and the Balance Sheet. This arrangement facilitates the compilation of these monthly statements by eliminating unnecessary turning of pages.

To arrange the ledger in the most efficient way is somewhat of a difficult task if knowledge about the relative activity of the various accounts is lacking. Therefore, an index to the ledger is given at the end of this lesson. This index should be written in the front of the ledger on the pages provided for it. This alphabetical index serves as a guide to the location of the accounts in the ledger. By merely opening each account on the page shown opposite to it in this index, the accounts will be arranged in the proper order and each account will have space proportionate to its needs. Be sure to preserve this

index. Its use will save you a great deal of time when you start your ledger.

Summary

1. The ledger and the journal are the essentials and the only essentials of an accounting system.

2. It is a hard and fast rule that no entry shall be made to the ledger without a previously made journal entry.

3. It is necessary to cross-reference the journal and the ledger by filling in the folio columns.

INDEX TO GENERAL LEDGER FOR STANDARD ACCOUNTING SYSTEM

Account Name	Page	Account Name	Page
Acceptances Payable	238	Merchandise	155
Accounts Payable	240	Money in Escrow	210
Accounts Receivable	184		
Advertising	61	Notes Payable	232
Allowance—Depr'n on Autos	108	Notes Receivable	180
Allowance—Depr'n on Furn.	104		
Allowance—Depr'n on Mdse.	116	Other General Expense	95
Allowance—Depr'n on Tools	112		
Allowance—Loss on Accts. Rec.	100	Petty Cash & in Drawer	208
Association Expenses	75	Postage Expense	58
Automobiles	138	Profit & Loss Account	274
Automobile Expense	89		
		Real Estate	130
Capital Stock	230	Rent Expense	45
Cash	198	Reserve—Depr'n on Autos	262
Cash Advances	212	Reserve—Depr'n on Furn.	258
Cash Discount Allowed	10	Reserve—Depr'n on Mdse.	270
Cash Discount Earned	36	Reserve—Depr'n on Tools	266
Cash Guaranties	144	Reserve—Loss on Accts. Rec.	254
Cash, Petty & Cash in Drawer	208		
Commissions Allowed	15	Salaries	40
Commissions Received	33	Sales Billed	1
Cost of Sales Billed	20	Sales Billed—Cost of	20
		Stationery & Off. Supplies	50
Deferred Charges to Income	228	Surplus Account	283
Dir. Job Exp.—Unbilled	165		
Dividends	280	Taxes Accrued	250
		Taxes Expense	66
Freight, Express, & Carting	30	Taxes Paid in Advance	222
Furniture & Off. Appliances	135	Telegraph & Telephone	55
		Tools	141
Insurance Expense	70	Travel & Entertaining	53
Insurance Premium Advances	216	Trade Acceptances Receivable	194
Interest	85	Trade Acceptances Payable	238
Investments	146		
Labor in Progress	170	Warehouse Upkeep	80
Light, Heat, & Power	48		

This lesson completes the second section of this course. Two-thirds of the course has now been completed.

The first section, comprised by lesson 1 to 4, described the means used by the Standard Accounting System in gathering the preliminary data necessary to keep a double-entry system of accounts.

The second section, which included lessons 5 to 10, explained double-entry theory, and the fundamentals of bookkeeping. This is the most important and the most difficult section of the course.

The third section of the course includes lessons 11 to 15. This section deals with the practical operation of the Standard Accounting System. It is chiefly concerned with the explanation of the time-saving features of modern bookkeeping.

The third section of the course will be easy to understand if the lessons on theory were thoroughly mastered. In order to find if you have mastered the previous lessons it is well for you to ask yourself these questions:

1. Do you understand the fundamental equation of accounting and the manner in which the three fundamental classes of accounts are evolved from it?
2. Do you understand the nature and function of each account appearing in the Summary of Operations and in the Balance Sheet?
3. Do you understand the nature and functions of the Ledger and the Journal?

If you cannot honestly answer these questions in the affirmative it indicates that you need to review the lessons on theory. The remaining lessons teach you the practical application of what you have learned. You could never operate a double-entry system efficiently without this training. Now that you have received it you will find that to learn to operate the Standard Accounting System is not a difficult matter. You have also greatly increased your capacity and qualifications as a business man by learning to read and to understand business and financial statements.

TRADE OF THE UNITED STATES WITH HAWAII IN 1920

Shipments from Hawaii to the United States practically doubled in value in the calendar year 1920 compared with 1919. The total shipments to the United States aggregated $192,383,185 in 1920, against $98,363,015 in 1919, an increase of $94,020,170. The principal increases were: Canned pineapples from $17,640,710 in 1919 to $29,176,104 in 1920, raw sugar from $74,153,389 in 1919 to $154,550,205 in 1920, refined sugar from $2,152,570 in 1919 to $4,162,032 in 1920. In both classes of sugar there were slight decreases in quantities in 1920; raw sugar decreased from 1,134,989,418 pounds in 1919 to 1,077,079,496 pounds in 1920, and refined sugar from 23,915,015 pounds to 22,547,635 pounds. Shipments of molasses rose from 9,882,567 gallons valued at $509,489 in 1919, to 12,126,132 gallons valued at $665,812 in 1920, and bananas from 115,127 bunches valued at $102,796 in 1919 to 182,772 bunches valued at $176,020 in 1920.

Shipments of coffee to the United States decreased from 3,144,351 pounds valued at $652,837 in 1919 to 1,885,703 pounds valued at $476,033 in 1920.

Shipments of merchandise to Hawaii during 1920 increased 48 per cent over 1919. For the year just ended the exports to that territory aggregated $74,052,453 against $49,983,869 in 1919. Increases occur in nearly every class; the principal ones are given in the following table:

Articles	1919	1920
Breadstuffs	$4,800,801	$6,239,102
Automobiles	1,873,318	3,698,937
Cotton manufactures	2,835,042	5,172,829
Electrical goods	1,006,343	1,562,711
Iron and steel manufactures	8,153,113	12,541,742
Leather, and manufactures of	1,164,897	1,702,831
Meat and dairy products	2,373,449	3,093,447
Mineral oils	5,848,552	7,812,531
Paper manufactures	1,326,738	2,013,523
Wood, and manufactures	3,100,438	5,857,377

MANILA PORT IMPROVEMENTS

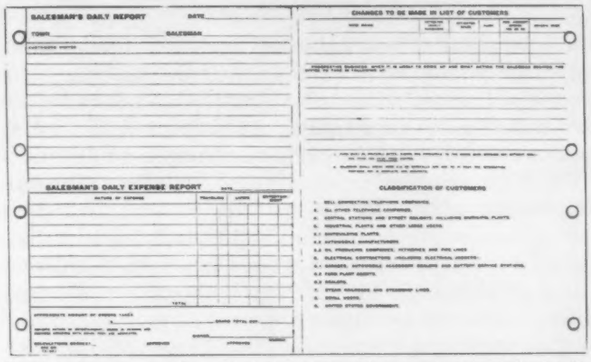
In a recent issue of the Bulletin of the Philippine Government Commercial Agency, it is stated that the port of Manila will soon be equipped with a modern marine railway or dry dock with a capacity of 8,000 tons, according to plans launched by the Honolulu Ironworks and the Earnshaw Shipways. The cost of the project has not yet been decided and the awarding of the contract is left with the representatives in Honolulu.

Western Dealer, Jobber and Agent

Business building suggestions for the store— Distribution and warehousing methods— Advertising and sales promotion ideas

KEEPING IN TOUCH WITH THE SALESMAN

In order that the home office may keep fully in touch with the work of the salesmen on the road, the Western Electric Company makes use of a system of


SALESMAN'S DAILY REPORT
CHANGES TO BE MADE IN LIST OF CUSTOMERS
SALESMAN'S DAILY EXPENSE REPORT
CLASSIFICATION OF CUSTOMERS

Front and reverse sides of the report which is sent in daily by the salesman on the road from each town which he visits.

daily reports in triplicate which provide all the necessary information in convenient form. A separate report is made out for each town visited so that this may be filed or transferred to other records.

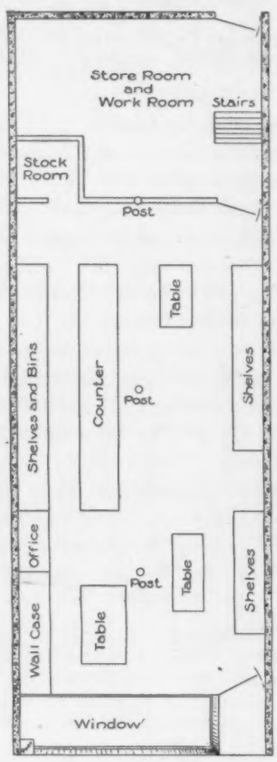
The record includes a report on the customers visited, any changes to be made in the names or character of account carried, the names and necessary information on new customers secured, word as to what action the salesman desires the office to take in following the matter up, and a detailed expense report. One of the most useful portions of the form is that which calls for a daily report of expense. This is summed up at the bottom of the page with two totals which appear opposite each other and which give the salesman a check on what he is actually accomplishing. These figures are those indicating the total amount of orders taken during the day and, secondly, the total expense.

PLANNING THE LAYOUT FOR THE SMALL STORE

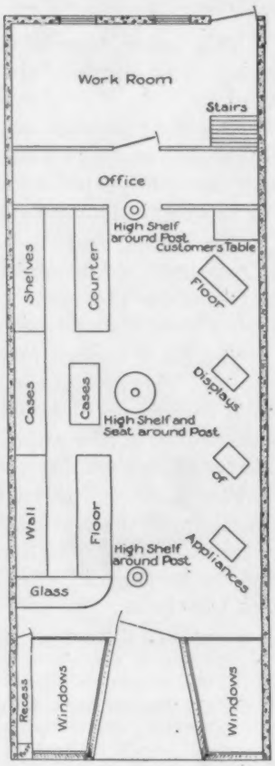
An effective plan for remodeling the small store is suggested by the sales promotion department of a leading manufacturer. The dealer who is hampered by a narrow floor space will find the accompanying diagrams suggestive of what can be done by a little rearrangement. The old store had a shallow window, crowded furniture and a cluttering of shelves, office equipment and pillars which prevented the dealer from any possible efficiency of workmanship.

The suggested improvements include deep double windows which permit of the carrying out of a real plan in window display, a wide aisle through the length of the store which will give a sense of roominess and will permit of the proper arrangement of larger articles—and a convenient and more sightly provision for the office. The posts are utilized by building circular seats about them and erecting circular shelves at a height of about six feet, on which can be displayed labeled devices which are being specially featured.

The opposite side of the store is occupied by a section of open shelves for labeled devices and by glass wall cases for hanging and portable lamps, and for miscellaneous goods. Glass floor cases provide display room for hollow ware and for other products which present an attractive appearance. The desk for customers is installed near the rear of the store and behind this the office stretches across the entire floor space. The workroom is provided with a rear outside door, and in any case is not visible from the interior of the store itself. Reserve stock is kept here and in the cellar. With a small store, only a limited number of appliances can be displayed at any one time, but this arrangement allows for great flexibility and gives opportunity for frequent change of display.



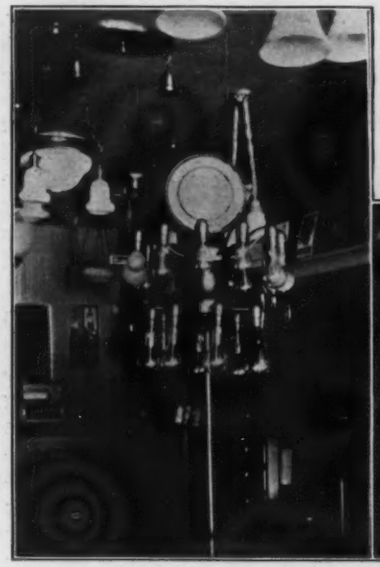
arrangement to be Remodelled



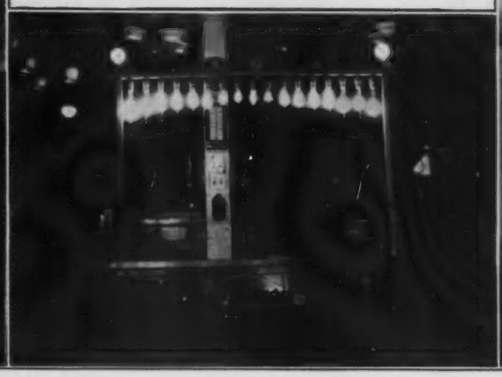
Remodelled Store Arrangement

Displaying Lamps

Southern California Electrical Dealers Use Many Different Methods

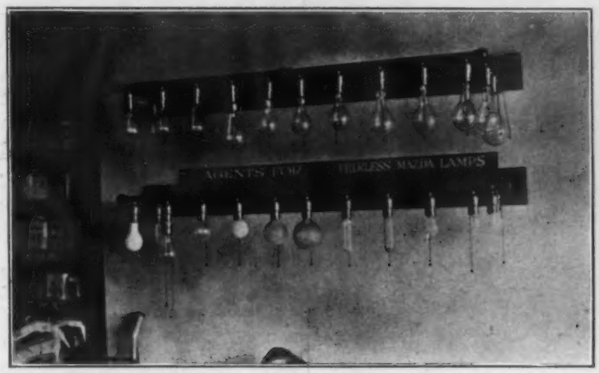


The lamp rack of the Granger-Hill Electric Company, Ontario, can be revolved, and the dealer's name is illuminated at all times.

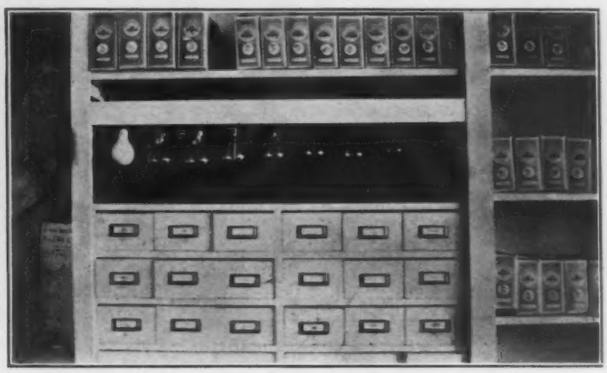


Pomona Fixture & Wiring Company, Pomona, mounts its lamp rack lengthwise on a special lamp counter. The rack is of brass tubing finished in old ivory.

Snyder & Bell, of San Bernardino, combine a lamp and appliance wall display case, finished to match the woodwork of the store.

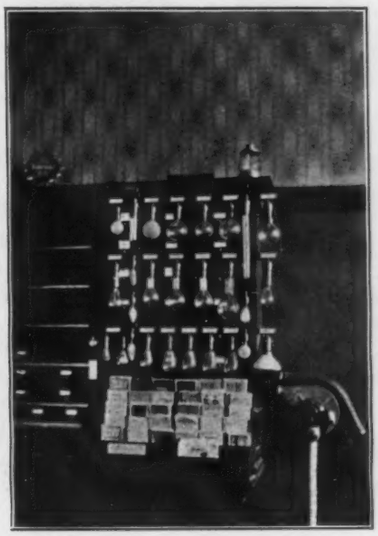


The lamp display rack of the Golden State Electric Company, Los Angeles, is made of black enameled iron conduit and is mounted on oak panels fastened to the wall in a conspicuous place.

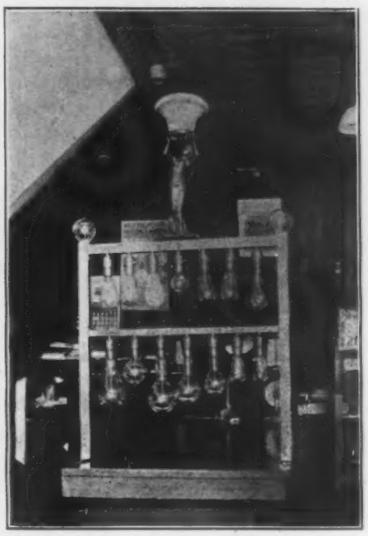


The Cope Electric Company, Santa Ana, uses shelf space for displaying lamps. The background is metal finished in dull black, and the lamps are individually controlled by push buttons on the rear of the counter.

The Southern Electrical Company of San Diego has an effective lamp display rack of square brass tubing finished in verde green.



A card placed over each lamp in the display of the Hartwell Electric Company, San Diego, shows the wattage, candle power and price.



The Southwest Electric Company, Redlands, uses a low rack, placed at the end of the counter where customers receive their packages.

EFFECTIVE OPENING MEANS LATER BUSINESS

The Live Wire Shop of Mt. Vernon, owned, operated and managed by C. W. Ricker, is all that the name implies. The store had its grand opening on June 18 at which time Mr. Ricker gave away certain electrical appliances valued at approximately $100, in the meantime securing a live prospect list of 1,000 names.

A telling stunt used by the Live Wire Shop of Mt. Vernon, Wash., to advertise its recent opening.

Visitors coming into the store on opening day were handed a numbered card. On this they were requested to jot down the names of electrical devices to be found in their own particular homes. In this way the store secured information which could be gleaned in no other way except by personal house to house solicitation. Later a drawing was held and the holders of winning tickets were presented with some domestic appliance.

The little girls dressed in the Mazda lamps, made from pasteboard cartons, walked about town or about the store during the entire day.

The store itself is neatly furnished in white enamel with wicker furniture, and presents a cleanly and open appearance which is most appealing.

THINGS TO DO AFTER MAKING THE SALE

BY J. E. BULLARD

A salesman selling electrical appliances called at a house and was informed that washing machines were not at all practical for domestic purposes. There might be some doubt in regard to vacuum cleaners, irons and the like but in this house the old way had been found much more satisfactory.

A little expert questioning developed the fact that this woman had purchased a washing machine because she thought it such a fine thing to have in the house and that it would make the work of the laundress so much easier. She was in the market at the time she purchased this machine for complete laundry equipment. In fact she would have purchased a great many more electrical devices. She herself was thoroughly sold on the idea of the complete electrical home.

Now it happened in this case that the same woman had been doing the washing for this family for years. And as is usually the case, this washwoman was not the most intelligent woman in the community. She did not understand that washing machine and it was not easy to show her how it worked. She decided it was lots easier to use a little brawn than to weary her brain attempting to master the intricacies of that queer machine. Besides she was not sure it would wash clothes satisfactorily.

All this time the man who had sold the machine and gotten cash for it was conspicuous by his absence. The machine had been delivered and demonstrated to the lady of the house. She was quite enthusiastic about it and there appeared no need of coming back. In fact she had herself said so. She would show her woman who did the washing just how to use it. This, however, did not prove such an easy thing to do after all. This new purchaser had at best only a hazy idea of the machine. She was not at all sure of herself and that excited suspicion in the mind of the washerwoman and made her afraid.

Had the man who first sold this washing machine instructed the wash-woman in regard to using it, had he sold the idea to the wash-woman, had he succeeded in getting her enthusiastic about it, he would have been able to sell another thousand dollars' worth of appliances in that house. As it was the washing machine was never used. It was merely placed out of the way in one corner of the laundry and allowed to rust.

There is a dealer who is doing a very successful business who makes it a point to take back any goods which he is not able to sell to the person who uses them. Recently a man came into the store and purchased an electric range. His housekeeper (he was not a married man) was on a vacation and he thought it would be a good idea to have the range installed before she got back. The dealer pointed out some of the chances he was taking in following this course, but the man was sure the housekeeper would like the electric range.

When she got back and tried out the range, however, she was not satisfied. She seemed to think that somebody had been trying to take advantage of her. The dealer heard of this and insisted upon taking the range back. This insistence completely changed the face of affairs. If the dealer was so willing to take the range back she decided there must be some good points about it after all and wanted to be shown those points before she gave it up. A thorough demonstration convinced her that this range was a pretty good thing after all, once a person got accustomed to it, and that range not only remained installed but that housekeeper is now a thorough convert to electrical appliances.

There is a certain hardware dealer who carries this idea so far that he will refuse to deliver an appliance or other article if he has good reason to believe that the purchaser will not in every way be entirely satisfied with it. He goes so far as to advise the purchase of something from his competitor and will even go over to that man's store with his customer and help him make a selection. He finds that as a result he is getting much more business than he is losing, or rather giving away. He is building good will.

All good will building comes after the sale is made and not before. The very best of salesmanship cannot build good will before the prospective customer makes a purchase. It is the satisfaction given by the article purchased that creates good will.

Builders of the West

IN 1879 Thomas A. Edison invented his loud speaking (chalk) telephone, and when he was sure of its merits he decided to exploit it in London. In looking around for a young man to handle this particular job for him, he discovered James A. Lighthipe, a native of Orange, New Jersey, who at the time was twenty-one years old. Preparatory to his work abroad under Edward Johnson, the young man was put through a course of training in the Edison Laboratories at Menlo Park, where he achieved the reputation of being an expert in preparing the little chalk cylinders that went into the telephone and, incidentally, became intimately associated with the "grand old man."

On October 11, 1879, the first successful incandescent lamp was made by Mr. Edison, and Mr. Lighthipe was "among those present" on this memorable occasion. No doubt Edison's associates in this adventure were not particularly enthusiastic over the long hours of tedious work which preceded the successful experiment, but there is not one of them now who does not consider October 11 a red-letter day in his calendar. Since then they have formed the Society of Edison Pioneers of which Mr. Lighthipe is a loyal member. About a month after this Mr. Lighthipe went to London and worked with the English Edison Telephone Company on the system that had been installed there. Later he was sent to Antwerp and spent about two years building the telephone system in Belgium, after which he returned to London and was associated with the British Insulite Company.

JAMES A. LIGHTHIPE

whose long record of constructive work in the solution of western engineering problems has won for him a unique position among the distinguished technical men of the West.

It was while working in Antwerp that he made a trip through Belgium on a high bicycle. The excursion was from Vervies through Aix la Chapelle, to Cologne, and this leisurely method of travel offered the same opportunity for close observation that was given Stevenson and Modestine in "Travels with a Donkey." This is characteristic of Lighthipe —he is never in a hurry but he always has an objective.

Within a short time the Edison Company started a factory at Ivry, near Paris, where Mr. Lighthipe helped construct the first Jumbo generators for the Milan Company in Italy. Also at this time experiments were conducted with the three-wire system just invented by Mr. Edison, and here Mr. Lighthipe developed the idea of the double bus-three wire system which was later installed in Wilmington. Following this he spent a year in Berlin, installing Edison plants in factories, and it was at this time that the first central station was achieved, being located near Unter den Linden.

All this took about five years, and in 1884 Mr. Lighthipe returned to America and engaged in the installation of Brush Arc Lighting sets. He worked in Trenton, Philadelphia and Wilmington and then was sent to San Francisco as superintendent of construction for the Edison Consolidated Electric Company, the predecessor of the present General Electric Company.

From an engineering standpoint, Mr. Lighthipe's principal contribution was his work in connection with the Folsom-Sacramento transmission line which was the real beginning of polyphase generation and transmission. Soon after this a three-phase line was built from Santa Ana River to Los Angeles for the Southern California Edison Company, and Mr. Lighthipe had charge of this work, the first transmission line to be operated at 33,000 volts. In 1908 he was engaged by this company as Electrical Engineer, and has held the position ever since.

In the Edison company he is an institution—a friend of everyone, and known to the entire organization as "Daddy" Lighthipe. One of his many friends has written that to know him is in itself a liberal education.

Mr. Lighthipe is the originator of the idea of using a Terrill regulator for obtaining constant potential at the distributing end of a transmission line. In 1904, while working in Oakland, he wanted to make some experiments along this line, so a large synchronous motor was borrowed from John Britton and connected to a line from the Standard Electric substation. Then the operator at the other end was told to raise his voltage by shifting taps on the transformers, and all hands were greatly surprised when this could not be done. Mr. Lighthipe's paper on this subject appeared in the Journal of Electricity in July, 1904.

In his capacity of superintendent of construction, Mr. Lighthipe in 1890 built the Pico-Maple Ave. line, the first electric railway in Los Angeles, and soon after started the nucleus of the present United Railroads in San Francisco, as well as the systems in Sacramento, Stockton, Fresno and Bakersfield.

He is Fellow in the American Institute of Electrical Engineers and was vice-president of that body for two years. He is also an Edison Pioneer, and a member of the Southern California Academy of Sciences.

His human relationships have been as important as his business connections and his fellow workers have always knows him as a friend and counsellor as well as a keen engineer and executive. He is one of those whom his associates delight to honor.

His hobby is pipe organs. In his home he has a fine organ which he plays very well but he claims that his interest in organs is scientific rather than artistic. When he goes to a large city for the first time, his natural impulse is to locate the finest organ there, and then he is not happy until he has had a chance to investigate its innards. As some men have scaled every high mountain in the country, Lighthipe has prowled around in every pipe organ that is large enough to be interesting. Prof. Eli Thompson is also an organ bug, and it was from this common interest that he and Mr. Lighthipe became intimate.

To James A. Lighthipe, whose pioneering spirit is responsible for many of our present practices in long distance transmission, this issue of Journal of Electricity and Western Industry is affectionately dedicated.

Activities of the West

A Business Man's Department Devoted to Events and Developments in Western Industrial Centers—Including News of Interest to Readers in Public Utility, Industrial and Trade Fields

Power Company Inaugurates Range Sale Campaign

Details of the Great Western Power Company's Plan to Increase Sales of Electrical Home Equipment

Electrical home equipment is to be sold under very favorable conditions to the consumers of electric energy generated by the Great Western Power Company, according to a recent announcement made by H. F. Jackson, general manager. This step is taken at a time when the general attitude of the purchasing public is to await more favorable market prices for all classes of products. The results of the recently inaugurated campaign will be watched with special interest. There is quoted below the letter issued by the power company to its district managers; the letter is complete except for a few details of interest only to company employes.

THE company proposes to purchase equipment and provide electric wiring under the most favorable terms possible and to resell the same to consumers on its lines at an exceptionally low price, giving to the consumer the full benefit of the company's purchasing power.

"The campaign will embrace the sale and installation, ready for service, of electric ranges, electric water heaters, tank covers and necessary wiring for connecting same to the company's lines. Substantially all standard makes of equipment will be provided at the request of the company, but the specific equipment listed herein, will be featured as covering a sufficient range to meet general requirements. If any specific type of equipment not listed herein is desired, special request for prices and delivery thereon will be made to the purchasing agent of the company; and such equipment will not be ordered or installed for the consumer until after a definite contract has been entered into and first payment made by the consumer.

"The equipment and wiring will be sold and installed by the company for cash accompanying the order or on time payments, but in the latter case 40% of the total contract price must accompany the order and the balance shall be paid at the rate of 5% per month without interest. If the purchaser at any time desires to pay up the balance then remaining on the contract, a cash discount of 10% will be allowed on such remaining balance so paid.

"In exceptional cases where premises are owned by the consumer or the owner of the premises is willing to guarantee the account, and when owner's credit is established, a smaller cash payment will be accepted by the company; but in all such cases special recommendation must be made by district managers and approval of the general sales manager secured in each case before the lesser initial payment is accepted.

"The prices given herein are unusually low and are exclusively for bona fide consumers on this company's lines and must not be given to others. Sales to others than consumers on the company's lines will not be made except under unusual conditions and if made at all, the prices listed herein must be increased in every such case 50% and the sale made for cash accompanying the order.

"Prices for equipment and wiring for bona fide consumers on this company's lines will be as follows:

	Cash	Time Payment
A. Electric Ranges:		
Westinghouse 219 B—Semi Auto.	$ 95.00	$104.50
Westinghouse 319-B—Full Automatic	135.00	148.50
Hughes—Hotpoint or Edison Open Coil Element, Non-Auto.		
R-63 Nickel Plate	135.00	148.50
R-67 Nickel Plate	161.00	177.10
R-83 Plain	152.00	167.20
R-85 Plain—Less shelf	115.00	126.50
R-85 Plain—With shelf	122.00	134.20
R-87 Plain—Less shelf	125.00	137.50
R-87 Plain—With shelf	132.00	145.20
Hughes—Hotpoint or Edison, Enclosed Coil Element		
R-63 Nickel Plate	140.00	154.00
R-67 Nickel Plate	168.00	184.80
R-83 Plain	159.00	174.90
R-85 Plain—Less shelf	120.00	132.00
R-85 Plain—With shelf	127.00	139.70
R-87 Plain—Less shelf	132.00	145.20
R-87 Plain—With shelf	139.00	152.90
Simplex Non-Automatic, Enclosed Element		
25	102.00	112.20
27	118.00	129.80
29	166.00	182.60
B. Water Heaters:		
Wessex 1500 watt outside circulating type, automatic, including Johns-Manville single ply or American Insulex tank covering installed on consumer's boiler. (Boiler to be furnished and installed by consumer.)	55.00	60.50
Wessex 5000 watt outside circulating type, automatic including Johns-Manville single play or American Insulex tank covering installed on consumer's boiler. (Boiler to be furnished and installed by consumer)	70.00	77.00
Thermelect 1500 watt Immersion with boiler complete	70.00	77.00
C. Wiring and installation of range, including outside service	Actual cost to Company to be determined and reported to consumer before making contract price.	Actual cost to Company plus 10% to be determined and reported to consumer before making contract and included in contract price.
D. Wiring and installation of water heater, including outside service if necessary	Actual cost to Company to be determined and reported to consumer before making contract and included in contract price.	Actual cost to Company plus 10% to be determined and reported to consumer before making contract and included in contract price.
E. Wiring and installation of both range and water heater, including outside service	Actual cost to Company to be determined and reported to consumer before making contract and included in contract price.	Actual cost to Company plus 10% to be determined and reported to consumer before making contract and included in contract price.

"It is contemplated that the 1500-watt automatic heater may be served on separate meter with flat rate provided on Company's existing schedule or on the block rate schedule through the meter supplying the range and other domestic service.

"If the 5000-watt heater is used it must be connected to the range circuit through double throw switch wired so that the range and water heater cannot be put into service simultaneously (a special flush double throw switch is preferable for this purpose and the cost of the same shall be included in the installation cost specified above). If the 5000-watt heater is used, the energy consumption thereof, together with the energy consumed by the electric range and the consumption for general domestic purposes, will be measured on a single meter and charged on the block system. (Schedule C-1.)

"It is believed that because of quicker recovery in the water heater system and better control of electric bills by the consumer, the 5000-watt heater under the block system will be more economical and therefore preferred by consumers.

"Arrangements will be made * * * with at least one electrical contractor in each district for the necessary wiring and installation of equipment * * *.

"We will continue servicing electric ranges and water heaters at no cost to the consumer except that material used will be charged for at our cost price.

"Factory guarantees will be taken advantage of at all times and the consumer allowed the benefit of all such transactions.

"It must be strictly understood that we do not commit ourselves to an indefinite policy of free service and that we may at any time discontinue free servicing of equipment or may charge for labor involved as well as material."

Washington Berry Growers' Association Purchases Cannery

The sale of the H. A. Baker, Inc., cannery at Sumner, Washington, to the Washington Berry Growers' Association of Sumner, for a consideration of $115,000, closed recently, is one of the largest transactions of the kind ever made in the Puget Sound section. The matter was handled by J. L. Bradley, manager of the association. The cannery was built in the spring of 1920. It is of pressed brick and cement construction 320 x 80 ft. The purchase includes thoroughly modern canning machinery, a brick boiler house, a large brick warehouse, with an electrified railroad spur running between it and the cannery, and three acres of land. Running full blast, the plant employs 200 people. The new owners control between 600 and 700 acres of berry-producing land in the Puyallup Valley.

The Modesto-Turlock Irrigation District Purchases Hydroelectric Power Site

Agreement Will End Condemnation Proceedings. — Pacific Gas & Electric Company Receive Electric Energy in Payment

Kilowatt-hours instead of dollars is the measure of value agreed upon by the Pacific Gas & Electric Company and the Sierra & San Francisco Power Company with the Turlock Irrigation District and Modesto Irrigation District, for the purchase by the districts of the LaGrange power house and other property owned by the utilities. The two irrigation districts are now engaged in building the San Pedro dam across the Tuolumne River and the impounded waters will submerge the LaGrange system owned by the Sierra and San Francisco Power Company under lease to the Pacific Gas & Electric Company.

Under the terms of the agreement the Sierra Company purposes to sell to the irrigation districts the property involved for 10,000,000 kilowatt-hours of electric energy per annum for a term of 25 years. This amount of electricity is to be developed by a hydroelectric power plant which the irrigation districts plan to build at the San Pedro dam. The LaGrange plant is not to be disturbed until the new plant is in operation, the construction of which it is estimated will take four years. In asking for confirmation of this agreement both parties joined in stating that it will be to the best interest of all concerned, including those now served by the LaGrange system. It is stated that the agreement when ratified will lead to the dismissal of condemnation proceedings begun by the districts and will avoid possible costly litigation.

Kettle Falls Site Purchased

Washington Water Power Company Makes Announcement.—Project to Develop 130,000 Hp.

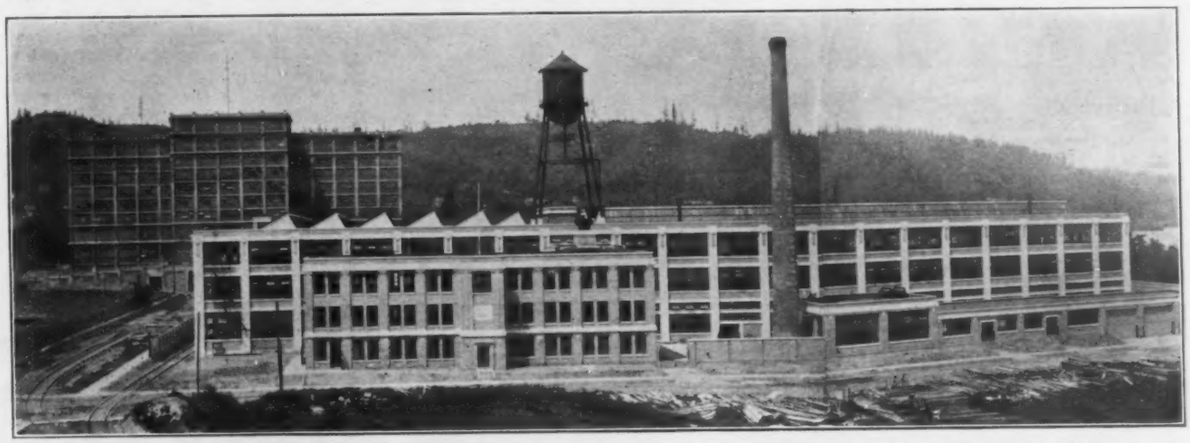
The Washington Water Power Company, in a circular letter to its stockholders sent out July 15, announced the purchase of the Kettle Falls power site on the Columbia River 75 miles north of Spokane. This site is capable of developing 130,000 horsepower at the low water flow of the river, and as this period on the Columbia is generally several months later than on the Spokane river, where the company's present plants are situated, the acquisition of the property is advantageous.

Kettle Falls of the Columbia lies between the towns of Marcus and Kettle Falls. There is a fall of 35 feet in a comparatively short distance which can be increased to 75 feet by dams. The power can be developed in successive stages starting with a unit of 25,000 horsepower. The summer flow is sufficient to provide extra power for irrigation pumping purposes, a use which promises to become quite general throughout the district.

The consideration for which the site was acquired from the Granby Consolidated Mining, Smelting and Refining Co., Ltd., was not made public, but as the full capacity of the falls is to be developed, the cost per horsepower will be quite low, it is understood.

When the Washington Water Power Company started the development of the upper falls of the Spokane river in the center of Spokane last fall, it began the utilization of its last undeveloped water power. The Kettle Falls site is acquired for the purpose of insuring against future needs.

The application has been filed with the Federal Power Commission.



Portland, Oregon, is rapidly forging ahead as an industrial city. During the past year a goodly representation of industrial plants have located here. The two plants shown are those of the American Can Company and the Montgomery-Ward Company. The substantial character of these buildings indicates the faith these companies have in the future of the Rose City.

Commercializing the Cooperative Campaign Idea

Reference to an advertisement that appeared on the front cover of Electrical Merchandising for June 1, 1921, and to the subsequent action of the California Electrical Cooperative Campaign, was made on page 82 of the July 15th issue of Journal of Electricity and Western Industry. In full justice to all people concerned in this matter, further statements of the case should be made and the Journal of Electricity and Western Industry takes great pleasure in making the following additional statement of the situation: The immediate response from the manufacturer and particularly from the manufacturer's Pacific Coast agents, when the situation was called to their attention, is to be commended. Under signed statement, the Bryant Electric Co., in the advertising columns of the Journal of Electricity and Western Industry for June 1, 1921, on page 28, states how they are squarely behind the movement of the California Electrical Cooperative Campaign, and the Pacific Coast representative, Mr. H. E. Sanderson, has done everything possible to right the situation. It is safe to say that manufacturers generally will be careful that situations similar to this do not occur in the future, and also that the electrical press will do whatever it can to see to it that advertisements appearing in its columns will respect the high ideals of the Cooperative Campaign idea. We commend everyone for the earnest and sincere effort displayed in righting a situation that will never again occur.

It is fully recognized by all parties that the incident above alluded to arose through lack of understanding concerning the campaign ideals covering the home electrical and not through any deliberate attempt to violate the principles of ethics of the campaign.

League of Municipalities, Southern Branch, Discusses Power Problems

At a meeting of the official representatives of forty-five cities and districts of southern California, water and power problems were discussed freely and preliminary plans were formulated much the same as the northern branch of the League of Municipalities adopted some time ago.

Resolutions urging the municipalities to make applications for benefits from the Colorado River development, and seeking to exclude private interests from the Boulder Dam project were adopted.

The City of Los Angeles denied any attempt to grab power—a charge appearing in the public press recently; they assert through their chief electrical engineer, that the charges are without foundation and not according to facts. Engineer Scattergood presented an official communication from the Board of Public Works of Los Angeles, which gave a large part of the details of the fundamental plans for power and water for the City of Los Angeles, some of the work dating back to 1907. He explained the interest the city had in the proposed Government project at Boulder Dam on the Colorado River, and outlined the conditions under which the small municipalities might benefit also. His general defense of the charge of "grab" on the part of Los Angeles was based on the published tables of present and proposed hydroelectric developments in Southern California, which he asserted were subject to verification from several sources and were considered as substantially correct by all authorities.

Convenience Outlet Campaign Actively Supported

California Electrical Cooperative Campaign Obtain Results Through Educational Publicity. — Report of Recent Activities

Investigation has shown that the amount of building activity in the southern part of the state is more than double that of the northern part; also that the greater part of the residence wiring in the south is done by contractors whom the Campaign has little opportunity to assist, either by group or by personal contact. In the north the residence wiring is largely done by non-association contractors under the supervision of small building contractors who do not require the services of an architect. In consideration of this condition, and with a desire to further the convenience outlet campaign, it was decided to discontinue the service of one field man in the north and divert that expense to a direct appeal to the public. The entire time of the electric equipment expert is devoted to calling on architects, builders and prospective home owners. During April, May and June the field representative in the north has called upon 157 individuals directly engaged in the building industry, together with many electrical contractors and dealers, and has attended their meetings.

Replies to a questionnaire from manufacturers indicate that the result of the emphasis placed upon convenience outlets by the campaign is an increase of 36 per cent in sales during the past year.

In an effort to bring about competition between home builders, the Campaign field man attaches a heavy cardboard sign reading "This Building Is Equipped With Electrical Convenience Outlets" to the front of buildings where there is at least one convenience outlet in each room. Buildings not completely equipped are not posted, and prospective home buyers visiting the different buildings for sale are taught to look for the outlets. This has served to create a demand for modernly wired houses. In order to further impress upon the public the necessity of convenience outlets and modernly wired homes, lantern slides have been shown in motion picture theaters in residence sections. The slides prominently feature the duplex flush receptacle with a stand lamp attached, and have the slogan—"Make Your Home Modern with Electrical Convenience Outlets." It is estimated from quotations received from residence district theaters, that this story will be told to at least 40,000 people per month.

Vancouver "Electrical Home" Dinner

The recent "Electrical Home" dinner, at which some 125 were present, was held under the auspices of the British Columbia Electrical Cooperative Association and the Vancouver Electric Club. They had as their guests a large number of architects and home contractors. W. G. Murrin, assistant general manager of the British Columbia Electric Railway Company, occupied the chair, and the speakers were John R. Read, local manager of the Canadian Westinghouse Co., who spoke on the Electrical Home; C. C. Carter, electrical contractor, who spoke on Convenience Outlets in the Electrical Home; and James Lightbody, publicity manager of the British Columbia Electric Railway Company, who spoke on Illumination in the Electrical Home.

One of the features of the evening was the sketch put on by E. E. Walker, sales engineer of the British Columbia Electric Co., who took the part of a home owner, and W. C. Mainwaring, district sales manager of the Northern Electric Co., who took the part of the architect designing the new home. The sketch forcibly brought out the need of education on the part of the general public of the necessity and convenience of adequate electrical wiring in the home.

The architects were headed by A. L. Mercer, president of a local architects' association, who replied on their behalf and assured the electrical men of their full cooperation. During the evening lantern slides of the various California Electrical Homes were shown and the amazing progress of this new idea described. It is expected that the building of electrical homes will be much hastened by the cooperation between electrical contractors and architects, such as was begun under such pleasant conditions at this dinner.

California Association Starts Reorganization of Local Sections

The California Association of Electrical Contractors and Dealers, under the able leadership of Clyde L. Chamblin, president, and J. W. Redpath, secretary, is overhauling the various sections of the Contractor-Dealers' Association throughout California. These local sections have in the past been very active in handling local problems and in forwarding the general development of the Association. The idea immediately ahead is to bring this action into general alignment so as to bring the whole force of the Association into still further development of Association activities, with particular reference to more efficient merchandising methods and lowering cost to the consumer in the matter of electrical installation.

In line with this latter policy announcement was made by Mr. Chamblin at a recent meeting of the San Francisco Electrical Development League, that recent lowering in construction costs of electrical work had much exceeded the lowering of labor costs, so that the public might profit to the fullest extent in these economies.

Wireless To Aid the Farmers

Seattle Market Reports to be Sent to Agricultural Districts Daily

In conjunction with local farm bureaus, Director E. L. French of the State Department of Agriculture is working out a system for the sending of Seattle market reports by wireless to each farmer in the producing sections of the state, daily, without cost to the farmers. Director French's scheme is to wireless the quotations from a central sending station in Seattle to all amateur stations or stations maintained by farm bureaus, to pick up under an arrangement that they shall be relayed by rural telephones. Efforts are being made by the state department to induce the Federal Bureau of Farm Markets to establish and maintain the Seattle sending station as the local application of the plan recently adopted for sending out national livestock quotations from the eastern stations.

New Hydro Project in Salt River Basin

Engineers of the U. S. Geological Survey are to investigate and report on another possible hydroelectric development in the Salt River basin. Eugene C. La Rue, chief of the bureau for Southern California with offices in Pasadena, has been getting his share of the flood of applications for filings on water power sites and this trip to Salt River basin is typical of the others already reported upon this year. He and Assistant Engineer Sopp will drive by auto through the mountain districts in order to thoroughly cover the territory involved.

This is the sixth investigation to be made by this office recently and the projects range in size from 500,000 hp. down.

Edison Clubs Growing Rapidly

W. G. Partridge, editor of Redondo Steam Plant "Edison Vibrations," has recently made a visit over the Southern California Edison system. About three months ago Mr. Partridge and others at the Redondo Steam Plant were instrumental in forming Edison Crescent Bay Club No. 1, an organization of company employes in and about Redondo, and devoted to the betterment of employe welfare and at the same time to the increasing of employe effort in behalf of their company. The movement has spread rapidly, and speaking of the recent trip made by Mr. Partridge, he had the following to say:

"Recently your editor took a trip with our Director of Education, Tommy Thomson, up north in the San Joaquin Valley for the purpose of assisting a few of the new Edison Clubs at their opening meetings. Monday night we were at Visalia, with Visalia Edison Social Club No. 6; Tuesday night at Porterville with Porterville Edison Club No. 4, and Wednesday night at Lindsay with Lindsay Edison Club No. 5. Delano in the same vicinity has organized but were not to have a meeting this week.

"A very large percentage of the employes in each district have become members of the clubs and all seem to be full of "pep" and ready to go, as soon as they get their equipment. It's going to make the members of the Mother Club—Edison Crescent Bay No. 1—hustle to keep up with these new ones. They already have a league base ball line-up with six teams and are planning to have their winning team play it off with some club team from the south. They are arranging for a joint picnic of all clubs in the valley for Labor Day, and they are all going in strong for the educational meetings, following our lead of starting with the question box. Here's success to all of 'em."

Contractors and Dealers of Oregon Plan Intensive Work in the Coming Fall

S. R. Sroufe, the newly elected president of the Contractor-Dealers' Association of Oregon, has started very energetically to work in the organizing of fall campaign activities for his Association. He typified this awakened activity by setting loose a number of heavy caliber firecrackers at the recent meeting at Eugene of the annual meeting of the Association. Oregon is beginning to feel the effect of the new Northwest Electrical Service League, under the able leadership of Stephen I. Miller, and in these activities such men as S. R. Sroufe, president, J. R. Tomlinson, secretary-treasurer, and F. R. Whittlesey, secretary of the Association, will give their most active and enthusiastic support.

Advisory Committee, California Electrical Cooperative Campaign Meets in Los Angeles

A meeting of the advisory committee of the California Electrical Cooperative Campaign is called for Monday, August 1st, at the Jonathan Club in Los Angeles. It is understood that at that time there will be considerable discussion as to whether the offices of the Pacific Coast Division, N. E. L. A., and the present offices of the Campaign should not be combined in one grouping. A committee which has been investigating this subject has found very suitable offices at the Rialto Building, San Francisco, on the seventh floor, but final approval for the change will be postponed until the Los Angeles meeting.

Montana Association of Electrical Contractors and Dealers Plan Fall Activities

James H. Mills of Great Falls, Montana, the recently elected president of the Electrical Contractors and Dealers' Association of Montana, is planning the new activities of the association for the fall with a view toward bringing to bear the very best effort of the association in forwarding the business activities of the electrical industry in the state of Montana. Due to the slackening of the mining activity, much of the construction work in the state has ceased, and as a consequence a higher, more efficient type of salesmanship is necessary to promote the merchandising of things electrical in the state, and Mr. Mills, who for many years was electrical inspector of the state and a graduate of the state university, will bring to bear upon the problem years of careful study in all phases of this activity, with which he is very familiar.

Skagit River Power Project

Ordinance for $5,500,000 Bond Issue Passes Seattle Council—Details of Engineering Work

An ordinance providing for the issuance of $5,500,000 worth of bonds to finance further development of the Skagit power project has been recently passed by the Seattle city council. According to estimates prepared by city engineer A. H. Dimock, this sum will cover the cost of the following work on the Skagit project:

Twenty-five mile railroad from Rockport to the power site; sawmill capable of cutting 25,000 feet of lumber daily; power plant of 3,000 hp. for construction purposes; timber crib dam for diverting the flow of the river from the site of the concrete dam (to be built when necessary); tunnel leading from this dam and conducting water to the power house, 21 feet in diameter, capable of carrying sufficient water to develop 112,500 hp.; three penstocks and valves conducting water from the tunnel to water wheels, each furnishing sufficient water to develop 37,500 hp., or a total of 112,500 hp.; a power house, for the installation of three units of 37,500 hp. each; two units consisting of water wheels and generator each; a transmission line capable of delivering 112,500 hp. from the plant to the city of Seattle; six substations in the city, for the transformation of this power; additions to the distribution systems in the city of Seattle, to enable the municipal lighting department to utilize the current thus furnished.

The bill was only recently introduced in the council and the passing comes after a favorable report of the public utilities and the finance committees.

British Columbia League Starts Campaign with Renewed Activities

The British Columbia Electrical Cooperative Campaign League, due to the arrival of R. E. Chatfield, the newly appointed executive manager, has started its fall activities in an enthusiastic manner. A number of notations have appeared in the columns of the Journal of Electricity and Western Industry regarding the cooperative campaign work at Vancouver. Here, however, is the beginning of real constructive activity in the way of an organized effort under definite leadership, and the working out of this Cooperative Campaign idea in British Columbia will be followed by readers generally throughout the West with a very great deal of interest.

California Highway Bonds Find Ready Market

An offering of $4,878,000 of 5¾ per cent California Highway bonds made on July 15, was oversubscribed on the same day that they were offered. The bonds sold at a premium of $19,550. The speedy sale, as compared with the great difficulty or inability to sell bonds in previous years is due to the higher rate of interest on the issue recently sold. Interest rates are now determined for each issue according to market conditions as determined by a commission.

Meetings of Interest to Western Men

Pacific Coast Division, N. E. L. A. Holds Executive Meeting and Decides on Future Policies

A. B. West, the newly elected president of the Pacific Coast Division, N. E. L. A., called an informal meeting of the Executive Committee recently at the Palace Hotel in San Francisco. The question of activities for the coming year was brought up, and it was decided that a number of public industrial conferences be held throughout the state, giving the same heavy emphasis on industrial matters as was brought out at the recent Del Monte gathering of the Association. There was also considerable discussion as to whether the Pacific Coast Division, N. E. L. A., should not be organized into an association to be known as the Pacific Coast Electrical Association, with which is affiliated the National Electric Light Association, and in such reorganization to open the Association to all branches of the industry with equal rights as to office, membership on Public Policy Committee, Executive Committee, and other matters. In regard to the budget for the forthcoming year, there has been some question in eastern headquarters as to whether this section would be allowed the 50 per cent pro rata voted some time back, and on this question Mr. West has taken a very decided stand for the Pacific Coast Division. The letter which he has written to the National headquarters at New York is as follows:

"I am in receipt of your letter of July 11th. We will make every effort to have the Pacific Coast Division budget in your hands shortly after the first of August.

"There is no question but that the necessary expenses of our Division will equal the full one-half of the Class A and Class B membership dues paid to the National Association, and the Division will expect that this will be approved without question. I think that we might as well be frank in the matter. The Pacific Coast Division is one of the most active, as you know, in the whole country, and it will not acquiesce in having its work crippled through the National Committee paring down its budget. Last year we consented to such a reduction in the budget by reason of the fact that we understood that the National Committee's finances were in a critical shape, by reason of a greatly enlarged budget being undertaken in advance of the period when the additional revenues from increasing the member company dues would be available. We understood, however, that this year the situation would be different.

"If it is proposed to repeat last year's action, I predict that it will result in steps being taken by the Pacific Coast Division to retain one-half of Class A and Class B membership dues before the balance is remitted to the East. I am writing this letter as it will be impossible for me to appear personally before the Executive Committee meeting to be held about the middle of August. Furthermore, I do not think that the Pacific Coast Division should be put to this large expense in order to obtain the approval of its budget. You are thoroughly familiar with conditions in our Division, and I believe can explain to the Committee the importance of the budget as prepared, being approved without question."

San Francisco Electrical Development League Forwards Civic Activities

In line with its fixed policy of looking into all activities of civic importance, the San Francisco Electrical Development League held a meeting Monday, July 18, devoted to this subject, at which Chief O'Brien of the San Francisco Police Department addressed the meeting. Mr. O'Brien brought forcefully home how the citizen can help preserve order in a community, first by proper attention to seeing that everything is safely locked up and put away, and secondly by notifying the police department of suspicious looking characters and any out-of-the-way thing that may happen in the daily life of the citizen. The meeting of Monday, July 25, was devoted to state problems, and Warden Johnston, the well known warden of San Quentin state penitentiary, spoke. Mr. Johnston has been a great advocate of the indeterminate sentence for prisoners and he brought home forcefully to his audience how hope was instilled and citizenship generally raised by the indeterminate sentence, and in those cases where the full force of the law must be brought to bear the prisoner was given longer sentences than prevailed under the old system. Ralph Wylie, chief of the Department of Electricity of San Francisco, presided over the first meeting, while Robert Sibley, editor of Journal of Electricity and Western Industry, presided over the second.

The Los Angeles Electric Club Adjourns for Summer Session

The Los Angeles Electric Club, which has had a very phenomenal growth during the past year and attained a membership of almost seven hundred, has adjourned for the two summer months. The activities of the club have best been shown in the enthusiastic manner in which they got behind the sale of power company securities, and the success of the Electrical Development Army in this work.

The results of the sales campaign are quoted from "Sparks":

Battalion	Stockholders No. of New	Par Value of Subscribed For Securities
Jobbers	581	$82,400.00
Manufacturers	376	82,400.00
Contractor-Dealers	177	29,400.00
	1,134	$194,200.00

"The result of the Electrical Development Army is more than gratifying. A good 'job' has been done, and done well. But—herein lies the good of the cause: It matters not that we have sold 1,134 new subscribers a total of $194,200.00 worth of electrical securities, but it is of great importance that we have sold 1,134 people in Southern California the Electrical Development Idea, the Self-Interest Story."

Electrical Contractors and Dealers Hold Sessions at Catalina Island

At the June meeting of the Southern District of the California State Association of Electrical Contractors and Dealers, which took place at Santa Barbara, California, there were over 110 in attendance. The Catalina meeting, which is to take place on July 30, bids well to far exceed the Santa Barbara meeting in attendance, as something like 150 seem sure of making the trip as these forms go to press. There will be members in attendance from San Diego to Santa Maria. Clyde Chamblin and J. W. Redpath, president and secretary of the California Association, are both in attendance.

The San Francisco Section of the American Society of Mechanical Engineers, under the leadership of E. C. Hutchinson, chief engineer of the Pelton Water Wheel Company and chairman of the local section, is already planning a helpful series of meetings for the coming months, which will include a discussion of the natural gas burning steam electric power plants at Bakersfield and Coalinga oil fields operated by the San Joaquin Light & Power Corporation, as well as a number of other topics particularly concerned with the operation of the Diesel engine aboard ship.

The Portland Section of the American Institute of Electrical Engineers at the annual meeting elected the following officers for the 1921-1922 season: Chairman, W. C. Heston; secretary, D. W. Proebstel; executive committee, R. R. Robley and J. E. Yates.

The Ogden Chapter of the American Association of Engineers will hold weekly luncheons, starting Thursday, July 21. The luncheons will be held in the banquet room of the Weber Club.

The Denver, Colorado, Section of the American Institute of Electrical Engineers has just elected the following officers for the ensuing year: chairman, Burton C. J. Wheatlake, manager of the supply department of the General Electric Company; vice-chairman, Edward A. Phinney, vice-president and general manager of the Jefferson County Power and Light Company; secretary-treasurer, Robert B. Bonney, educational director of the Mountain States Telephone and Telegraph Company. At the meeting Prof. L. D. Crain of the mechanical engineering department of the Colorado Agricultural College, spoke on electricity on the farm.

COMING EVENTS

INTERNATIONAL ASSOCIATION OF MUNICIPAL ENGINEERS
Colorado Springs, Colo.—Sept. 6-9, 1921

AMERICAN ASSOCIATION OF PORT AUTHORITIES
Annual Convention—Seattle, Wash., Oct. 11-14, 1921

AMERICAN ASS'N FOR ADVANCEMENT OF SCIENCE, PACIFIC COAST SECTION
Berkeley, Cal., Aug. 4 and 5, 1921

Manufacturer, Dealer, and Jobber Activities

The Benjamin Electric Manufacturing Company of Chicago has recently put on the market a line of model sanitary food receptacles which are watertight and odor proof. The contents are kept hermetically sealed by close fitting cover with rubber gasket held securely by a positive pressure aluminum clamp. This line is marketed under the name of Kelly-Kontainer.

The General Electric Company will have a large exhibit, comprising a variety of its products at the seventh National Exposition of Chemical Industries to be held in 8th Coast Artillery Armory, New York City, Sept. 12 to 17.

The Packard Electric Co. of Warren, Ohio, announces the appointment of Jos. C. Bowman as advertising manager vice G. P. Blackiston, resigned.

The Riddle Electrical Co., 114 North Catalina Ave., Redondo, Cal., claims the distinction of being the largest electrical equipment concern in Southern California outside the city of Los Angeles. Mr. Riddle has recently purchased the electrical business of Sprenk & Sons with whom he was previously connected. The company will specialize in power plant and other heavy electrical installations.

Rathbone, Sard & Co., of Aurora, Ill., manufacturers of the "Acorn" line of ranges, recently announced the production of a combination electric and coal range. Some of the features of the range are: four electric hot plates; two-hole cooking top; electric oven; fire box for coal, coke or wood; waterback for coil linings; high shelf with enamel splasher; mercury thermometer; General Electric sheathed wire units.

The Continental Pipe Manufacturing Co. of Tacoma, Wash., recently received an order for four miles of 8½ in. inside the diameter, wood stave pipe from the Parker-Young Company of Vermont. The order is one of the largest ever received in the Northwest, and marks an important step forward in the return to normalcy in the lumber industry of the Northwest. Joe L. Long, president of the company, stated that the choice of the Douglas fir wood stave pipe by the engineers of the eastern company was made upon the record of performance of other installations of the Tacoma company in Vermont.

The Western Electric Company has announced a change in the organization of the Denver Branch office. **Tyler L. Holmes**, who has been general manager of the Denver plant, has been transferred to an executive position in the eastern office of the company. The Denver Branch will divide into two departments under separate heads covering the work formerly done by the main organization in both Denver and Salt Lake City. **A. C. Cornell** has been appointed in charge of the supply department and will also head the supply department of the Salt Lake branch. The telephone department, which will be separated from the sales organization, will be headed by **Harry C. Argabrite**, who will also have the managership of the Salt Lake branch.

L. L. Collier and **B. W. Mullan** have formed a partnership under the name of the East End Electric Arc & Acetylene Welding Company, with a shop located at 212 East Main Street, Walla Walla, Wash.

The Holabird Electric Company, with offices in San Francisco and Los Angeles, will be sales representatives for the Weber Dependable Wiring Devices, Boston, Mass. Their interests will be under the direct supervision of H. A. Sayles, secretary of the Holabird Electric Company.

The Coast Equipment Company, with offices in San Francisco, Los Angeles, Portland and Seattle, has been appointed Western distributors for the Mechanical Appliance Company, of Milwaukee, Wis., and also Western agents for the Ridgway Dynamo & Engine Company of Ridgway, Pa.

Barthold-Strecker Company is the name of a newly organized firm now located at 104 Pine Street, San Francisco, with a fine display of engineering instruments and equipment. Both Mr. Barthold and Mr. Strecker are well known through their extensive experience in these highly specialized lines.

The Edison Electric Appliance Company's factory at Ontario is doubling up on orders since the recently made price reduction in heating appliances, and Mr. Richardson is quoted as saying the factory will very soon be on its full time, full help basis again.

The Western Electric Company has recently put into operation an elaborate direct-by-mail selling service, available to their jobbers in personal solicitation of their prospects.

The Pacific Car & Foundry Company, Renton, Wash., recently secured a contract from the Northern Pacific Railroad Company for the construction of 1,000 box cars and gondolas, involving an expenditure of about $300,000. **C. D. Colvin**, vice-president of the company, states that the contract is one of the largest of its kind ever handled in this district, and indicates a revival of normal business conditions. About 300 men will be employed in the work.

M. W. Wheeler has recently been appointed Western distributor of the Airway Electric Appliance Corporation, of Toledo, Ohio, manufacturers of the "Airway" vacuum cleaners and washing machines. Mr. Wheeler's local address is 220 Builders Exchange Building, San Francisco.

The Majestic Electric Development Company, through its sales manager, T. D. MacMullen, is adding a statement to all advertising literature sent out by the company that should be helpful in forwarding the convenience outlet campaign. The statement appended is as follows: "The more convenience outlets installed, the greater the sale of electrical appliances." This will appear on every circular letter that is being issued, and will be included in all their newspaper and magazine advertising. The newspaper advertising will appear in from one to three newspapers in the various larger cities throughout the country and will run from early in September to the end of the year.

The Pacific Foundry Company, of San Francisco, iron founders and metallurgists and manufacturers of "Corosiron," have recently issued a descriptive, Lefax size, bulletin describing "Corosiron" and the products manufactured from this acid-resisting material. The pamphlet also contains a number of carefully selected Lefax tables of value to the engineer using their products.

The Northwest Envelope Manufacturing Company, recently incorporated, has selected Seattle as the site for its proposed factory. **Bert P. Boles**, president and general manager of the company, announces that the company has acquired 10,000 square feet of floor space at 617 Western Avenue, and machinery will be installed immediately. Offices will be established in the chief cities of the Northwest and Pacific Coast.

"Make way for a little stranger!" Thus said J. J. G., a well known leader in a supply department for a prominent eastern manufacturing concern, when he stepped forth and took all the money from the crowd shown here assembled. Now that this picture has been outlawed, due to the kindly veil of time represented by the passing of two years, we publish it. It is a scene in the high Sierras along the bristling shores of the San Joaquin river. With his back to us is Emory Wishon and facing us is Ike Alexander, while Glenn Arbogast, R. M. Alvord, Harry Noack and other prominent figures in western industry are to be noted. And the "little stranger" on the left, intently watching the game and stooping over toward Glenn Arbogast, is our friend J. J. G. Can you guess who he is?

Rey E. Chatfield, formerly with the Federal Board for Vocational Education and recently on the faculty of the summer session of the University of California at Berkeley, has accepted the position of executive secretary for the British Columbia Electrical Development Association with headquarters at Vancouver. Mr. Chatfield goes to his new position well equipped for cooperative campaign work in that he has had eight years of experience in the small store, four years of which time he was manager of two small stores.

REY E. CHATFIELD

He was a graduate of the University of California with the class of 1914 where he took the course in the College of Commerce under the direction of Professor Henry R. Hatfield, who has strongly recommended him for the new position in Vancouver. The British Columbia Electrical Development Association has been well under way for some months past and with definite executive management now available its progress will be watched with a great deal of interest by members of the industry throughout the West.

B. E. Drayer, secretary of the American Association of Engineers, is expected in San Francisco during the first three days of October. Mr. Drayer has been very active in Association matters and it is expected that he will spend some time in visiting the various local sections of the Association in Western centers.

M. H. Aylesworth, executive secretary of the National Electric Light Association with headquarters in New York, has returned to his eastern headquarters after a visit in Pacific Coast centers. While in the West he made a number of notable addresses relative to the service the public service industry is rendering and the intimate part the National Electric Light Association is playing in this work.

Theodore Burger, formerly with the Western Electric Co. of San Francisco and later with Baker-Joslyn Co. in Los Angeles, has joined the staff of the Society for Electrical Development, Inc. with headquarters in New York City. Mr. Burger, now associated with Mr. Goodwin, both of whom are western men, will undoubtedly have broad opportunity of displaying the western vision of things electrical which he has so ably mastered during a long residence in the West.

Personals

B. T. Ergenbright, who has been manager for the Southern Sierras Power Company at Victorville, California, has resigned to undertake the managership of the Bear Valley Utilities Company which will handle all power, light, sewage, water and telephone utilities of the valley.

G. R. Ramsay, city engineer of Orlando, Florida, is in California making a thorough study of the highway construction methods throughout the state.

George W. Fitch, field secretary of the California Manufacturers' Association with headquarters in Oakland, California, has returned from a trip covering the greater portion of the state of California in the interests of his association, which now numbers over 1100 industries of California.

I. B. Hobsbawn, consulting and technical chemist of Valparaiso, Chile, who has been studying mill engineering and construction throughout the country, was a recent visitor to the Pacific Coast.

Marshall J. Maxfield, formerly with the Mt. Whitney Power and Electric Company of Visalia, Cal., and more recently with the department of electrical engineering of Pennsylvania State College, has been appointed director of laboratory instruction, department of industrial and electrical engineering of the Pratt Institute, Brooklyn, N. Y. He will assume his new duties September 1st.

Harold G. Bowen has been appointed engineering officer at the Mare Island Navy Yard. Commander Bowen succeeds Captain M. E. Reed, who was recently appointed senior aid to the Commandant in charge of industrial activities.

C. A. Bigelow, treasurer of Stone & Webster Co., Inc., with headquarters at Boston, Mass., is a recent Pacific Coast visitor.

James H. McGraw, president of McGraw-Hill Company, Inc., of New York City, has returned to his New York headquarters after a visit of four weeks in California, where he spent his time in resting and in visiting typical engineering activities and organizations in this section of the country.

W. K. Tucker, a graduate of the University of California with the class of 1910, has left the employ of the Hercules Powder Company as chemical engineer, where he has been engaged in eastern business centers for them for the past several years, to come again to California and settle in the San Francisco Bay district.

Henry E. Jackson, director of the National Community Board, an organization representing sixteen departments of the United States Government, recently gave an interesting talk before the Commonwealth Club of San Francisco on the subject of a new industrial revolution, in which he forcibly brings out the fact that there is a solution for every industrial problem provided the community itself handles the question under a public community committee.

Frank Bonner, chief engineer of road construction for the U. S. Forest Service with headquarters at Washington, D. C., is a recent Pacific Coast visitor. Mr. Bonner visited Los Angeles, San Francisco and other cities, which included a lengthy stay in his old home town, Missoula, Montana.

F. E. Johnson, Jr., vice-president and general sales manager of the M. W. Kellogg Co., New York, who was in San Francisco recently, is on his way to Japan in the interests of his company. From Japan he will continue to India and return to New York by way of the Suez Canal.

R. J. Davis, Pacific Coast representative of Century Electric Company, is taking a rest under doctor's orders, as it is expected that a rest of some weeks will be necessary to put him again in his usual state of good health.

George W. Craven has been appointed as president of the Montana State School of Mines. He succeeds **C. H. Clapp,** who has been chosen president of the state university at Missoula.

Clyde Chamblin, president of the California Association of Electrical Contractors and Dealers with headquarters in San Francisco, is in attendance at the Catalina Island gathering of the Southern District of the California Association of Electrical Contractors and Dealers. **J. W. Redpath,** secretary of the Association, is also in attendance, and in addition is visiting a number of the various sections of the Association in different parts of the state.

George L. Myers, assistant to the president of the Portland Gas & Coke, Pacific Power & Light, and Walla Walla Valley Railway companies, was re-elected vice-president of the Northwest Electric Light and Power Association for the state of Oregon at the Portland convention. Mr. Myers has been very active in bringing about the cooperation of the men in the electrical

GEO. L. MYERS

industries of the Northwest, especially in the bringing about of better business methods and establishing better public relationships. Previous to his association with the companies mentioned above he was with the Oregon-Washington Railroad and Navigation Company. In 1912 he became treasurer of the Pacific Power & Light Company and private secretary to the president of the three associated companies.

Curtis M. Lindsay has been appointed business manager of Journal of Electricity and Western Industry in addition to being secretary-treasurer of McGraw-Hill Company of California. **H. W. L. Gardiner** continues as vice-president of the California company but has resigned as business manager of the Journal in order to concentrate his activities on the local interests of the ten McGraw-Hill papers published in the East, for which he is Pacific Coast business manager. Mr. Gardiner will also exercise supervision over the Pacific Coast advertising of Journal of

CURTIS M. LINDSAY

Electricity and Western Industry. Mr. Lindsay has now been in the San Francisco office of the company for about six months, having been transferred here from New York. His former work with the Hotpoint Company and later with the Edison Electric Appliance Company, followed by his work in the eastern offices of McGraw-Hill Company, has pointed him out as a man of quiet business balance with a thorough familiarity with the details of the publishing business.

Guy Flenner of Boise has been named managing director of the Idaho Reclamation Association to succeed the late Major Fred Reed. Mr. Flenner will conduct an extensive educational campaign throughout the state for the next ninety days, the purpose being to collect the next year's budget.

George Armstrong, Pacific Coast editor of Electrical World, has been spending some time in visiting Salt Lake City, Butte, Montana, Spokane, Seattle, and is again in his San Francisco office.

S. M. Kennedy, vice-president in charge of public relations for Southern California Edison Company, is a recent San Francisco visitor. It will be interesting to note in passing that the well-known book of Mr. Kennedy's entitled "Winning the Public" has received such a rapid sale throughout the country that it is now soon to appear in the form of a second edition with two additional chapters covering interesting phases of development that have taken place since the book appeared a year ago.

Daniel H. Braymer, managing editor of Electrical World, together with his wife has returned East again after visiting Salt Lake City and San Francisco, passing on his way eastward through Yellowstone National Park.

Howard E. Sandoval, formerly in charge of range sales of the Alameda county district for the Pacific Gas & Electric Company, later in the Navy of the United States and more recently in private business at Modesto, has returned to the San Francisco Bay region to enter work in the electrical industry, announcement of which will be made later.

R. E. Smith, in the general office of the Southern California Edison Company at Los Angeles, has recently delivered a very interesting talk on the Einstein Theory before the Los Angeles Electric Club, the Advertising Club and the various Edison Company organizations. Mr. Smith hasn't quite been able to demonstrate the fact that the image seen in the telescope is really the man himself, as Mr. Einstein claims, but he gets pretty close to it in his deductions.

A. B. West, vice-president and general manager of the Southern Sierras Power Company and president of the Pacific Coast Division, N. E. L. A., is a recent San Francisco visitor, during which period he has been formulating many of his plans for Association activities for the coming year.

Ivar Herlitz, who holds one of the fellowships for the American Scandinavian Foundation in electrical engineering and has been located at Union College, Schenectady, N. Y., during the last year, is a recent Pacific Coast visitor, where he has spent some time in visiting at Los Angeles, San Francisco and Spokane points of interest in hydroelectric development.

George O. Muhlfield, vice-president and general manager of Stone & Webster Company with headquarters at Boston, Mass., is a recent Pacific Coast visitor where he has spent some time in visiting Seattle, San Francisco and Los Angeles centers of activity.

E. B. Bumsted, consulting engineer with headquarters at San Francisco, is in Los Angeles where he has spent several months in developing his activites for oil shale products, but expects to be back again in San Francisco shortly.

John H. Rosseter, formerly vice-president of W. R. Grace & Company, steamship operators, has severed his connection with the company to devote more of his time to the Pacific Mail Steamship Company, of which he is vice-president and general manager.

C. W. J. Coleman, M. J. Canny, G. H. Wion and **H. Sergeant** of the Victorian Railways and **W. A. Clark** of the New South Wales Railways have arrived in San Francisco to make an intensive study of the methods for the handling of materials and supplies in use by the Southern Pacific Company.

E. V. Vandercock, president of the Western Federation of the American Association of Engineers, was a recent Ogden visitor, en route from San Francisco to New York City. While in Ogden Mr. Vandercock conferred with President B. W. Matteson of the Ogden chapter of the American Association of Engineers and other officials. Mr. Vandercock was entertained with a trip to the Hermitage and other points in Ogden by Ogden engineers before departing for the East. At New York Mr. Vandercock will confer with national representatives on engineering problems.

S. L. Shuffleton, Pacific Coast manager of Stone & Webster Company with headquarters at San Francisco, is just completing the work of his company on the Caribou plant of the Great Western Power Company in the lining of the final tunnel taking the waters from Lake Almanor, and is transferring part of his force to the dam of the Snow Mountain Power Company on Eel River, in California, which construction work his company has recently taken over.

John D. McKee, vice-president and treasurer of the California Oregon Power Company, and **John A. Britton,** vice-president and general manager of the Pacific Gas and Electric Company, snapped by our special photographer as they completed the latest "interconnection" of these two companies by tenderly locking arms. It is certain that this latest "interconnection" is an

indication of the perfect synchronism that must exist between the various power companies if the industrial and commercial development of the West is to be brought about to the fullest extent. The best part about this interconnection is that it took place on the properties of the Great Western Power Company on the occasion of the opening of the Caribou power plant.

Obituary

Albert Taylor, manager North Atlantic district, The Edison Storage Battery Co., and well known in the electrical industry, died suddenly on July 6th in New York. Mr. Taylor was taken ill in his office, 23 West 43rd St., New York, and died a few hours later in the hospital. He was buried from his home in New Rochelle on July 8th.

S. H. Chatten, president and controlling owner of the Union Lumber Company, Union Mills, Wash., died of heart failure in Kansas City, on July 12. Mr. Chatten was 58 years old, and considered one of the country's leading lumber manufacturers. He was president of the Southern Lumber Company, operating at Myrtis, La., and one of the first southern operators to become active in West Coast lumber operations, having established himself in the western industry in 1906.

Business Outlook in Western Market Centers

Reflecting the Trend of Community Thought on Conditions and Events Affecting Business and Industrial Activities Throughout the West

SAN FRANCISCO

Transportation problems and the labor situation are topics of discussion by all classes of business men in San Francisco and the Bay District. The way to connect the city with Oakland by means of a tunnel, bridge and mole has been indicated, and the peninsula cities are agitating the electrification of the Southern Pacific lines as far as San Jose in order to bring about the development of this section. After almost two months of comparative inactivity there is considerable building throughout the city, although this has been resumed in a cautious manner, as building investors are looking for lower costs of material and labor. All building under way is conducted on the American plan. The labor unions affected by the building strike have attempted to enlist other unions in support of the closed shop, while there is considerable sentiment on the part of the employers in other trades to insist upon the American plan of operation. Not only is there a feeling that the American plan of operation will be the rule in San Francisco in the future, but also there is a conviction that if the city is to develop industrially closed shop conditions cannot be tolerated. As the result business men are putting up with conditions as they now exist and looking forward to the future with a feeling of optimism.

While business is depressed—partly as the result of the strike tie-up and increasing unemployment in other lines—there is a sound general undertone and a feeling that the worst has passed. Under present conditions no one is attempting to predict a definite date for the beginning of the upward trend of industry.

LOS ANGELES

Power is the vitalizing factor of Western industrial growth. None of the industrial cities of the West can hope to continue to develop unless ample provision is made for the future demands for power. During the past two weeks an avalanche of public opinion has descended upon Los Angeles as the result of the condemnation by the city of one of the power plants of the Southern Sierras Power Company. But the interesting thing in the trend of the public opinion, as expressed by the newspapers and by individuals, is that it is directed against the city rather than against the power companies. Public opinion is not favorable to the power companies in this instance, but has taken the form of protesting against the city of Los Angeles grabbing all the hydroelectric power sites from which power can be made available throughout Southern California. Other cities than Los Angeles are looking forward to greater industrial growth and are considering the possibility of a power shortage with apprehension.

General conditions in and about Los Angeles are unchanged, building activity continues with but slight reduction in volume. The recent price reductions in automobiles has improved sales, indicating a reserve buying power on the part of the public; sales of the higher priced cars are particularly strong. Summer resorts, however, report trade below normal. The agricultural situation has improved, and very good crops are being obtained at harvest. Collections are fair and bank clearings ahead of last year. Labor is well employed.

SALT LAKE CITY

No material change has been experienced in general business conditions in the intermountain section during the past two weeks.

Farmers are beginning to harvest their crops, and this has created some demand for money, although a rather quiet period has prevailed in banking circles. Bankers report that while money rates have become slightly easier in the East no great change has been experienced locally as yet. There appears to be a general holding off of money for investment purposes.

Crop prospects in Utah and the surrounding states are reported to be the best in years, although farmers are somewhat concerned in regard to market and prices. With fair prices and good market it is expected that much liquidation will result, which will materially aid the banks. The prices and demand for market products are somewhat better, and there is a tendency on the part of farmers to sell their produce and get out of debt, rather than to hold on for better market prices.

Although there are at the present time a great many men looking for employment, the unemployment situation has been somewhat relieved by temporary work being provided to quite a number of men on farms.

The local retail trade reports business generally good. Local dry goods companies have been active with clearance sales. The lumber and hardware business is being stimulated by increased building activity. Home building activity in Salt Lake, as a matter of fact, will greatly eclipse that of last year. Reduced prices for material and labor are contributing largely to this favorable situation.

Mining conditions have shown little change during the past two weeks. Copper mining operations continue to be practically at a standstill. This, however is not the case with the silver-lead operators, and mining conditions along that line are considered as fairly satisfactory. Some of the miners who were thrown out of employment because of the shutdown in the copper camps have secured employment in other mining camps where silver-lead properties are operating.

Trade in electrical appliances is rather slow. Dealers are continuing intensive sales work and advertising, but the buying public seems to be holding off to a considerable extent. Electrical contractors are securing quite a satisfactory share of business on account of increased building activities mentioned above.

Two large irrigation pumping projects, namely, the Bonneville irrigation project, just north of Salt Lake City, and the Provo Reservoir Company, about twenty miles south of Salt Lake City, have just completed their plants, and electric current has been turned on to operate their pumps. As a result of the operations of these companies, it is expected that many thousands of acres of land will be reclaimed and made to produce good crops. Several other smaller projects are in course of organization.

On the whole, business conditions are considered as satisfactory as could be expected, with considerable optimism as to the future.

PORTLAND

Although business is still far below normal there seems to be a general spirit of optimism and some feel that there will be a gradual improvement from now on, and it is generally conceded that early fall will see a marked improvement in nearly all lines. Retail trade in seasonal lines is good while in others it is quiet. Wholesale buying continues on a restricted basis to fill present wants only, with little tendency to lay in large stocks.

It is expected that the settlement of the marine engineers' strike will have a very stimulating effect upon shipping from this port, particularly in grain. The financial aid being given the railroads by the government, it is expected, will result in the placing of large orders for lumber with the mills of Oregon and Washington. This is hailed by lumbermen as a harbinger of better times in the lumber industry. Activity in residence construction continues and the decision to proceed with the construction of two new hospitals immediately adds impetus to building in the commercial line.

Electrical jobbers report practically no change in business conditions although the tendency is in the right direction. It is expected that recent price reductions in some lines will have a stimulating effect.

SEATTLE

While there is no marked development in general business that would justify undue optimism, still there is an underlying current of renewed confidence that is doing much to improve conditions. No one can point to a definite improvement, but there is a disposition to expect better things—a feeling that the "buyers' strike" is breaking—and a tendency to discourage undue pessimism.

The recent failure of the Scandinavian-American Bank in Seattle caused a slight panic on the part of the public, with a consequent run on the Dexter-Horton National Bank, admittedly one of the strongest financial institutions in the Northwest. Such an occurrence coming at a time when the public confidence has been somewhat undermined by business depression might have caused serious results—but the public statement on the part of Dexter-Horton Company that their bank would open one hour earlier and remain open until 8 o'clock at night, in order that all depositors might be given prompt service, acted as an antidote to the rumors of financial difficulty, and served to immediately restore confidence.

Department stores are holding their mid-summer and July sales, and the volume of sales has been heavy during the past week. Genuine bargains are offered, indicating to the public that a return to something near normal prices may be expected. In fact, the public will not buy at this time unless it is made to feel that the price asked is decidedly lower than the "war" prices.

The passing of the most prolonged period of extreme depression ever known to West Coast lumber industry seems to be marked by prospective early buying of considerable volume. Lumbermen in this district believe that with a resumption of railroad purchases, a general improvement will be noted in the Fall, with a probable return to normal by Spring, providing further freight rate readjustments restore competitive conditions for West Coast lumber in eastern markets. Production for the past month has been only 46 per cent of normal, due to the heavy stocks on hand at the various West Coast plants.

The labor situation does not show a marked improvement in the Puget Sound district. Industry, as a whole, has shown little increased activity that would demand additional workers. The shut-down for the Fourth of July holidays, usual in this section in logging camps and mills throughout the entire district, was more extended than usual this year, but a majority of these camps have now reopened with a full crew. No difficulty is noted in obtaining competent help in all lines.

New building in Seattle is comparatively satisfactory, with something over a million and a half dollars' worth of work under way in June. A very fair amount of this is for new residence construction. Industrial building is not particularly active, although several projects of some magnitude have been undertaken.

Electrical jobbers report a slightly improved situation, with considerable activity in line construction material. Home appliances have been moving fairly well, especially "hot-weather" equipment.

SPOKANE

For the time of year and in view of general conditions, business is good. Retail trade, while feeling the usual summer lull, is yet good and so are collections. Outside the city, this is not true, particularly with regard to collections, and necessarily will not be until after the harvest. This is in progress already in some sections of the Inland Empire. Reports from all districts give glowing accounts of the winter wheat crop which is practically made. Spring wheat with continued cool weather or a little rain will also yield an excellent crop.

Crop reports are the basis of an optimistic feeling. Bankers expect that the bumper crops in prospect will be the means of extensive liquidation this fall which will afford a foundation next spring for an excellent year. There are no large building operations in Spokane this year, the total value of building permits falling far below that of last year, but whereas last year there were few houses under construction, this year building is almost exclusively limited to residences. Many are being put up by the owners for homes and others are under construction by contractors for sale. Every section of the city has new homes under construction and the result is most noticeable in driving about the city. The home building movement, repressed during the war because of government necessities and since by excessive prices, has fairly started again. This has not yet started in the surrounding country towns, which all report house shortages, but with a good harvest this should begin next year and with the prospects in Spokane for a better building year than this, will probably take on the aspects of a real building boom with consequent shortage of carpenters.

The hope of the passage by Congress of a tariff on lead is causing a better feeling in the Coeur D'Alenes where most of the producing mines are shut down because of the low price of lead. The lumber business is still in the doldrums with demand light and prices weak, but lumbermen note building resumption locally and in various places throughout the country with satisfaction and make it the basis for hope for next year.

Books and Bulletins

Ejector Cutouts

Schweitzer & Conrad, Inc., of Chicago, Ill., have issued a pamphlet describing their Type E ejector cutout. The S. & C. ejector cutout has been developed to meet the demand for a reasonably priced but absolutely reliable transformer cutout for voltages up to 6600. Fuse elements for use in this cutout are made in various capacities ranging from 10 to 100 amperes.

Selling With Colored Lights

Considerable progress has recently been made in the development of equipment for colored lighting of display windows by the Ivanhoe-Regent Works of the General Electric Company. Two units of particular interest have been developed and are now receiving wide attention because of the increased use of color in window displays. These are the Iris equipment for display window lighting and the Iris spotlight used in connection with colored lighting displays for emphasizing the particular object on display. Two pamphlets that have recently been issued describe the Iris equipment and the use of this equipment for window display lighting.

Hydraulic Turbines

I. P. Morris Hydraulic Turbines are described and illustrated in a recent bulletin issued by the Wm. Cramp & Sons Ship & Engine Building Company of Philadelphia. The bulletin reviews the development of hydraulic turbines and briefly describes the notable improvements in hydraulic turbine machinery developed by this company. Of particular interest is the following statement quoted from the introduction: "The vertical-shaft multiple-runner type of turbine has become practically obsolete, and the horizontal shaft type which totaled nearly 25 per cent of the installations made by this company in the years 1910 to 1915 represents only 6 per cent of our installations in the years 1915 to 1920. As an indication of the continued trend toward increased capacities, it is interesting to note that the average unit horsepower of turbines manufactured between 1910 and 1915 amounted to 9,500 horsepower. From 1915 to 1920 this was increased to an average unit capacity of 13,200 horsepower.

"For the year 1920, the unit capacity of turbines under construction by this company averaged 17,000 horsepower."

Some of the larger turbine installations manufactured by this company are as follows:

The 37,500 horsepower turbines built for the Niagara Falls Power Company; the 55,000 horsepower turbines under construction for the Hydro-Electric Power Commission of Ontario; the 30 000 horsepower turbine for the Southern California Edison Company; the 30,000 horsepower turbine for the Muscle Shoals Development of the War Department, and also the 41,000 horsepower turbine for the Shawinigan Water & Power Company, under construction by the Dominion Engineering Works, Ltd.

The improvements developed by this company have made it possible to guarantee efficiency in excess of 90 per cent over a range of from 50 per cent to full load capacity.

The General Electric Company has recently perfected a new form of sheath wire for electric heating applications. The new unit is known as the Helical coil sheath wire unit, being a decided improvement over the drawn sheath wire unit which the company has manufactured for several years, being stronger and lending itself to a wider range of industrial heating appliances. The units are made in different sizes and of several capacities and of alloys adapting them to various uses.

Construction News and Industrial Developments

Suggesting to the Engineer, Contractor, Manufacturer, Dealer, Agent and All Business Men Opportunities for New Business

THE PACIFIC NORTHWEST

OREGON CITY, ORE.—The contract for building a new bridge across the Willamette River between Oregon City and West Lynn has been awarded to A. Guthrie & Co. on a bid of $215,602.

PORT ANGELES, WASH.—The plant of the Puget Sound Mills & Timber Company has closed down for repairs and renewal of equipment. The plant will be completely electrified and resume operations about September 1st.

TACOMA, WASH.—The National Cocoanut Oil Company of Tacoma is now operating at the former plant of the Columbia Brewing Company and has remodeled the structure to accommodate the new line of business. Production will be devoted to laundry soaps, washing powders, etc.

TACOMA, WASH.—The Buffelin Lumber & Manufacturing Company is rushing work on an extensive building program, which includes an expenditure of approximately $360,000. Included in the program is a power house costing $150,000; a veneer factory costing $160,000, and a planing mill costing $50,000.

RAYMOND, WASH.—The steamer Munaires of the Munson Steamship Company's fleet arrived in port last week and loaded 5,500,000 shingles, representing the output of all the lumber mills in this district. She later sailed for Everett and Tacoma, where she will complete her cargo. This is the first time that any of the Munson Line's fleet has ever put into this port.

VANCOUVER, WASH.—The Koster Products Co. of Vancouver is to build a furniture factory which will employ between 3,000 and 5,000 men, according to a recent report. The company is at present operating a small furniture factory and plans to erect the new plant on a 150-acre site adjoining the Standifer Shipyards. The new plant is necessary to take care of the company's rapidly increasing business of manufacturing high grade furniture in large quantities.

VANCOUVER, WASH.—According to a preliminary report issued by the Dominion bureau of statistics and the department of fisheries on the valuation of Canada's fish catch for 1920, the chief commercial fish were: Salmon, $15,595,970; lobsters, $7,162,475; cod, $8,270,171; halibut, $4,583,188; herring, $3,337,738; whitefish, $1,992,197; haddock, $1,522,680; mackerel, $1,126,703; trout, $858,942; sardines, $860,268; smelts, $789,361; pickerel, $682,277, and pulchards, $340,265.

SALEM, ORE.—The expenditure of $3,000,000 in new power development is contemplated by the Portland Railway, Light & Power Co. as disclosed by an application for water right filed with the state engineer recently. The application involves the storage of 100,000 acre-feet of water in Big Bottom reservoir on the Clackamas River and the diversion of 600 second-feet of water through a tunnel from the Clackamas River to Oak Grove Creek for the development of 58,600 horsepower.

SALEM, ORE.—The development of 58,000 horsepower, proposed in an application filed with the state engineer by the Portland Railway Light & Power Company, for the appropriation of 100,000 acre-feet of water from the Clackamas River. It is proposed to convey the water by means of canals and tunnels a distance of several miles and develop approximately 58,000 hp., under a head of 860 feet. The estimated cost of the project is $2,000,000. Although no immediate construction work is contemplated, work will probably be begun within a year.

THE PACIFIC CENTRAL DISTRICT

TRACY, CAL.—The city is planning to construct and operate a municipal gas plant.

MADERA, CAL.—The city trustees have ordered the installation of a pump and electric motor for the water system of the Hughes addition.

MODESTO, CAL.—Contract for the construction of a telephone exchange building, estimated cost $45,000, has been awarded to Monson Bros. of San Francisco.

OAKLAND, CAL.—Construction will soon be started on a $100,000 building for the Oakland Title Insurance & Guarantee Company. The building will be located at 15th & Franklin streets.

SAN FRANCISCO, Cal.—The Taiwan Electric Company, operating in the island of Formosa, is calling for bids for the equipment necessary for a hydroelectric project of approximately 150,000 hp.

RICHMOND, CAL.—The city is planning the expenditure of $35,080 for an electrically operated pump, additional pipe and other necessary expenses to provide the city with an adequate water supply.

SANTA ROSA, CAL.—The California Telephone & Light Company is rapidly completing a new power line into the Trenton section, and as a result many residents in that section are enjoying the benefits of electric service.

TURLOCK, CAL.—The city council has granted the Tidewater & Southern Railway, a subsidiary of the Western Pacific Railway, a 49-year franchise to operate a commercial railroad by steam, electricity or otherwise through the city.

CHICO, CAL.—The city trustees are planning a municipal water supply and have secured figures from the Chico Water Supply Co., which has offered to sell its holdings. City Engineer F. S. Robinson has been instructed to prepare estimates of cost for the complete system.

VALLEJO, CAL.—Estimates of the cost of the proposed municipal water supply project of this city have been submitted to the council by engineer L. Thompson. Estimates of the cost of construction of septic tanks at Wild Horse Valley and Fleming Hill have also been submitted.

SAN FRANCISCO, CAL.—Bids are being received by Charles T. Phillips, Pacific Building, for the construction of a reinforced concrete power house and also for general equipment for the same building, including a 150-hp. oil engine. Total estimated cost of project is $100,000.

TRACY, CAL.—The Board of Directors of the West Side Irrigation District have appointed a committee to investigate the possibility and advisability of cooperating with the Modesto and Turlock Irrigation Districts or other irrigation districts using power, in order to cheapen the cost of this power and more adequately supply the districts.

EUREKA, CAL.—It is announced that a new company will be organized to utilize the refuse from the gas plants of the Western States Gas & Electric Co. It is proposed to compound the tar and coke produced in the gas plant and to sell this product locally under the trade name of "Synthetic Coal."

UKIAH, CAL.—Work will be resumed on the Eel River dam of the Snow Mountain Power Company by the contracting firm of Stone & Webster Co. Work on this project was discontinued the first half of july when a San Francisco contractor announced he would no longer work on the project.

GRASS VALLEY, CAL.—An election for the formation of an irrigation district and the election of officers will be held here August 4th. Construction of a diversion dam, conduit and distributing system, estimated to cost $4,000,000, is planned. S. H. Tibbetts of San Francisco is engineer for the district.

SAN JOSE, CAL.—Through the sale of about 8,000 acres of marsh land by the Spring Valley Water Co. to the Continental Salt & Chemical Co. the fact is disclosed that the latter concern is to considerably expand its present manufacturing equipment. The land is to be used for the purpose of collecting and manufacturing salt and a number of by-products.

IRVINGTON, CAL.—Reed Bros., Inc., of San Francisco, manufacturers of hospital supplies of all kinds, including surgical instruments, rubber goods, and furniture, have announced that they will build a manufacturing plant here. The first unit will be a concrete building, of class A order, to cost approximately $100,000. This will be followed by additional buildings.

MARTINEZ, CAL.—G. B. Putman of Walnut Creek has been named Contra Costa county representative of the Stewart Fruit Co., and is making preparations for the opening of several packing houses in the central part of the county. Arrangements have been made for a packing house at Walnut Creek and it is planned to open packing houses at Alamo, Lafayette, Hookston, and Muir.

NEVADA CITY, CAL.—The Excelsior Water & Power Company has established an engineering camp at Bowman Lake and has a large crew engaged in surveying the big water and power project it has undertaken. The company, a subsidiary of the Ayer interests, plans an immense hydroelectric development in this region and also the distribution of water to a large area of agricultural land.

OROVILLE, CAL. — According to an announcement made by O. C. Griffith of the Hutchinson Lumber Company, decision has been reached to start construction of the company's sawmill and box factory September 1st. The sawmill will have a daily capacity of 400,000 board feet and will be one of the largest in the West. It is proposed to have the plant completed and ready for operation by April 1, 1922.

YREKA, CAL.—Organization of the Klamath-Shasta Irrigation District, to include 125,000 acres in the Shasta Valley, was voted by an overwhelming majority at a recent election. The next step will be the organization of the district and the raising of the money with which to make a detailed survey of the project, which calls for the tapping of the Klamath river and using the overflow waters from Klamath Lake for irrigation purposes.

THE PACIFIC SOUTHWEST

SANGER, CAL.—A new theater building is to be built here. Plans are being prepared by W. H. Tully of Fowler.

FRESNO, CAL.—A new branch post office to handle city distribution, to cost $35,000, will be built here. Construction is to start in August.

COLTON, CAL.—The Colton Fruit Exchange will equip its entire plant with power operated conveyors and in addition will make other improvements.

SEAL BEACH, CAL.—The California Willite Construction Co. will establish a plant here for the manufacture of road pavement and has purchased a site on Electric Avenue.

HOLBROOK, ARIZ.—Contracts have been let for the improving of the Alamogordo Electric Light Plant, and the city will soon have one of the best plants of this kind in the state.

LONG BEACH, CAL. — The Golden State Woolen Mills, Inc., has announced their intention to rebuild their plant which was destroyed by fire in April. The new building will cost $650,000.

LOS ANGELES, CAL.—The Southern California Gas Co. has purchased the lease on the seven-story Goodrich Building at 946 South Broadway. $50,000 will be expended for remodeling and improving the building.

SANTA ANA, CAL.—A new pumping plant and complete new machinery, as well as the construction of a new reservoir and pipe line, are contemplated by the Newport Heights Irrigation District. A $160,000 bond sale has been announced.

SAN DIEGO, CAL.—The California Gypsum Corporation is planning to build a narrow gauge railway line from the plant at Coyote Wells on the San Diego-Arizona Railway to the gypsum deposit 15 miles north. An additional plant in San Diego is contemplated.

BIG BEAR VALLEY, CAL.—The Bear Valley Utility Co., recently incorporated, proposes to supply the Big Bear Valley with electric energy. Power lines and distribution system are to be built. Power is to be purchased from the Southern Sierras Power Company.

BEAUMONT, CAL.—The directors of the Beaumont Irrigation District have decided to start at once on the construction of a pipe line in Wallace Canyon. Approximately 2,000 feet of pipe will be installed as a means of conserving the flow of water in the canyon.

SANTA BARBARA, CAL.—The Ord Ice Co. is preparing plans for doubling the present capacity of its plant, located at the corner of Canon Perdido and De Lavina Street. An additional ice machine will be installed and the improvements will cost approximately $50,000.

LOS ANGELES, CAL. — The Pruden-Burr Unitsteel Construction Co., a subsidiary of the Metal Shelter Co. of St. Paul, plans to manufacture portable and collapsible steel buildings of all sizes and dimensions. Temporary offices are being maintained in the Douglas Building.

LOS ANGELES, CAL.—The Los Angeles Street Railway will spend about $500,000 in carrying out extensions to its present power equipment, according to George J. Kuhrts of the Street Railway Department. The sum of money will be expended to erect automatic substations of sufficient capacity to meet the demands of the local transit system for several years.

LOS ANGELES, CAL.—Plans have been completed by the Southern California Telephone Co. for the addition of four floors to the Hill Street office building and one floor to the Olive Street building. The four floors added to the Hill Street building will be used for extra office space and the extra floor added to the Olive Street building will be utilized as a cafeteria for the employes.

PHOENIX, ARIZ.—It is proposed to build an electric power line from the plant of the Salt River Valley Water Users' Association to the Casa Grande Valley, estimated to cost $110,000.

LOS ANGELES, CAL.—The Southern California Edison Company has applied to the Railroad Commission for authority to issue and sell $6,000,000 of its general and refunding 6 per cent, 25-year, gold bonds. The proceeds are to be used to finance the cost of extension and to liquidate indebtedness incurred the past year for its hydroelectric development on Kern River and on Big Creek.

THE INTERMOUNTAIN DISTRICT

AULT, COLO.—The city has voted to sell the distribution system of the municipal electric light plant to the Home Gas & Electric Company of Greeley, Colorado.

WINNEMUCCA, NEV.—The power plant of the Winnemucca Water & Light Company was entirely destroyed by fire recently. The estimated loss is between $60,000 and $70,000. The entire equipment will have to be replaced.

RENO, NEV.—The board of directors of the department of state highways announces that agreements have been made with the Federal Government whereby $1,866,000 will be expended by the government on highway work in Nevada.

ALAMOSA, COLO.—A hydroelectric plant at the falls on Butte Creek, on the south slope of Mt. Blanca, which will supply power and light to a large section of the San Luis Valley, is proposed by Denver men, whose representatives were here recently to investigate the proposition.

LEVAN, UTAH.—The town board has signed a contract with the Big Springs Electric Company of Fountain Gree, Utah, to furnish electric power. Before long work will commence on the system and some time during the autumn the town will have an up-to-date lighting system and power with which to operate different industries.

MOAB, UTAH.—Work has begun on the installation of the new lighting system on Main Street. A line strung from iron poles will be run on each side of the street. Since the old poles were removed from the center of the street and the thoroughfare graded and surfaced, several months ago, the street had been in darkness.

EUREKA, UTAH.—A connection has just been made which will make possible the use of electric power at the new East Tintic shaft of the Chief Consolidated mine. This shaft, which will be three-compartment in size, has been equipped with modern hoisting machinery, and extensive development work, at a rapid rate, is planned for the near future.

MILES CITY, MONT.—Cordial endorsement of the project for furnishing power and irrigation for the Yellowstone Valley from Forsyth to Glendive, Mont., through the installation of a hydroelectric plant at Buffalo Rapids was given at Miles City, Mont., recently by E. F. Benson, colonization agent of the Northern Pa-Pacific. He said: "This project is modern and its value to the state and all its interests cannot be calculated in mere dollars. I sincerely hope it will go through."

PARK CITY, UTAH.—The steel for the new mill of the Silver King Coalition mine is now commencing to arrive. Sixty men are employed in cement work, carpentering, grading, excavating, etc., and construction work on the mill proper will be commenced in the near future. Reports from the mine are of the most encouraging nature. Development work opening up ore reserves in new territory assures a bright future for the Silver King Coalition. About 300 men are now on the payroll.

IDAHO FALLS, IDA.—The brick plant on the west side of the river and north of the city about a mile, has resumed operations after having been shut down for a considerable period. The owners of the plant state that there is little call for brick at the present time, but that they expect some building operations will soon be resumed, and that then the market will be opened. It is the purpose of the plant to make a sufficient supply of common brick so that it will not be necessary to ship any of that grade here.

POCATELLO, IDA.—It is understood that crews will be started to work at once on the Boise-Mountainhome irrigation project in the vicinity of King Hill. A topographical survey, financed by the federal government and the Boise Commercial Club, will be made to determine the feasibility of putting water on the arid land described in the project. The twenty-five mile stretch from Milner, in the King Hill region, will, in a large way, determine the expediency of going on with the construction. In this area decomposed ground, gullies, lava and other hindrances to engineering will be encountered.

BOISE, IDA.—Notice by the federal government that the Dead Ox Flat irrigation district had filed June 6, 1912, for a power site on the south fork of the Payette river at the point where the city of Boise has under consideration a power plant, was contained in a letter read by the city attorney of Boise at a recent meeting of the city council. It was brought out in the letter that the irrigation company's right was still in force, and that some agreement might be reached with the district by the city if the erection of a power plant were decided upon. The communication explained that the company could only use a portion of the power developed. The matter has been taken under advisement.

SALT LAKE CITY, UTAH.—Moses M. Dahle, of Salt Lake City, has filed application with the state engineer of Utah for the storage of 10,000 acre-feet on the Little Bear river, in Cache county, to be used as a supplementary supply of water in irrigating 9440 acres of land. The reservoir is to be constructed by a dam 600 feet long and sixty feet high, a few miles upstream from Wellsville, according to the application, storing the waters of the Little Bear river from October of each year to July of the following year. Stored waters would be released during irrigation season and allowed to flow downstream to a point in the vicinity of Newton, where the water would be taken out by a pumping plant for a supplemental supply on the lands covered by the application.

BUHL, IDA.—A new milling company has been organized in Buhl, to be known as the Buhl Flour Mills, Ltd. The stockholders of the new organization have elected the following officers: Ralph Rendla, president; J. J. Rugg, vice-president; Claud Brown, secretary; A. H. Dixon, treasurer and general manager; P. F. Ahlquist, director. The company is organized with a capital of $100,000, of which $27,000 is paid up, and has bought lots near the railroad, next to the canning factory, and has begun excavating for a new building and water mains. Manager Dixon states that the building will be thirty-two feet by forty-two feet, and four stories high. The machinery has been ordered and will be shipped when the building is ready to house it. Electric power will be used, and a steam plant will also be installed for heating and steam-rolling barley. Eighty barrels a day will be the initial capacity. However, the plans call for an arrangement whereby units may be added to bring the capacity up to 200 barrels a day. The company estimates that it will take from sixty to ninety days to install the machinery after it arrives. An effort will be made to push the work so that some of this year's crop can be handled.

THINGS WHICH NEED INVENTING

A straw hat of boomerang shape, that will come back when it blows off.

A pocket instrument for opening railroad car windows.

A neighbor's chicken which does not come into your garden.

A non-skid plate for things served on toast.

A square nickel that will not roll off the street car.

* * *

INTERPRETIVE DANCING

I saw a barefoot lady dip,
And kneel and rise and poise and hover,
As if to pin a pillow slip
Upon the line stretched high above her.
"This must be comedy," I said,
"Some esoteric highbrow joshing,
This nymph who moves with classic tread
Is hanging out the family washing."

The program told me I was wrong—
The dance was labeled "Slumber Song."

I saw a maid with flying feet,
Whose clothes were singularly airy,
Go running through a field of wheat,
With all the fleetness of a fairy.
When I had gazed awhile askance
At her abbreviated habit,
I thought "The title of this dance
Is 'Girl in Nighty Chasing Rabbit.'"

My guess was wrong—the program said:
"A Russian Peasant's Prayer for Bread."

Six damsels, very sparsely clad
In white diaphanous confections,
Came tearing in and ran like mad
In many different directions.
"Aha!" I cried, "I think I get
The meaning of this scene before us;
The title of it, I will bet,
Is 'Mouse Stampedes a Ziegfeld Chorus.'"

But my conjecture went astray—
The dance was "Woodland Birds in May."

(Borrowed.)

* * *

WASTED MOMENTS

Reading the weather forecast.

Getting information from windows labeled "Information."

Listening to speeches that begin, "We are about to enter upon a new era."

Deciphering a business man's signature when it is printed at the top of the letterhead.

Hunting for news in an "Extra."

Figuring out where the street car will stop.

* * *

Long distance transmission is a wonderful science. We notice an item in a Nevada paper stating that as part of a super-power plan it is proposed to construct a transmission line between Portland, Ore., and Baltimore, Md. Evidently the news of two super-power surveys, one in the Northwest and one on the Atlantic seaboard, has been too much for the reporter, and he has been unable to resist the temptation of tying them in.

HIGH FINANCE

A man came into an electrical store with an electric iron needing a slight repair. He waited until the job was finished, and being told it would cost a dollar, handed the dealer a five-dollar bill. The dealer was unable to make change so the customer said:

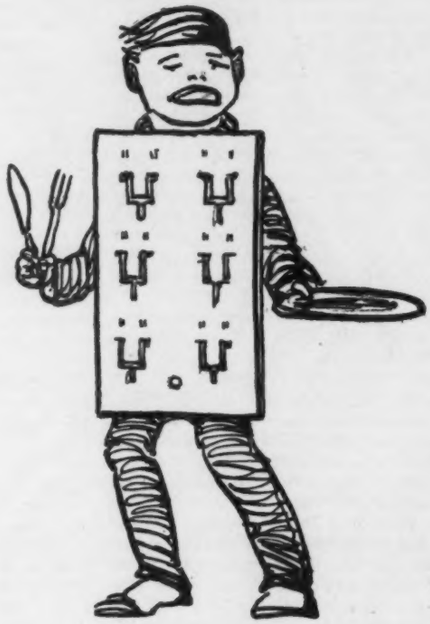
"I must take the iron back with me and I haven't another cent in my pocket. Let me have a dollar and I'll come back for the bill tomorrow."

The dealer consented, took the five-dollar bill, and handed the customer a dollar and the iron.

The following day the man returned, gave the dealer four dollars and took his five-dollar bill. Was this a profitable transaction for the dealer?

* * *

ELECTRICAL HYBRIDS



VIII—The Electric Switchboarder

The switchboarder's usually found with a knife;
He never was late for a meal in his life;
But though most monotonous fare will appease him
When feeding him currents 'tis risky to tease him.

His face seems expressionless, yet you should know
That he is the chap who makes everything go;
And if when you want him you use the right handle,
You won't need to light up your place with a candle.